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(71)出願人 000231682

日本石油化学株式会社
東京都千代田区内幸町1丁目3番1号

(71)出願人 000143488

株式会社高分子加工研究所
東京都板橋区加賀1丁目9番2号

(72)発明者 栗原 和彦

東京都板橋区高島平3-11-5-1002

(72)発明者 矢沢 宏

東京都国立市東2-25-15

(74)代理人 100088328

弁理士 金田 暢之 (外2名)

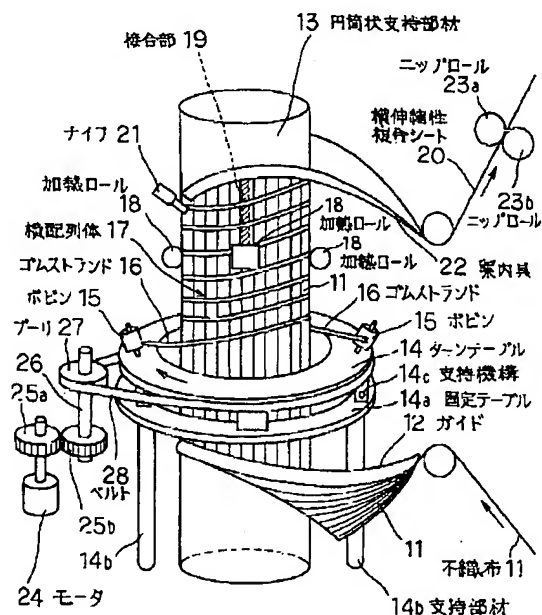
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(54)【発明の名称】 横伸縮性複合シートの製造方法

(57)【要約】

【課題】 横伸縮性複合シートを製造する際に、使用する弾性体を有効に利用でき、簡便な製造プロセスで高速に製造することを可能にする。

【解決手段】 固定された円筒状支持部材13へとガイド12を通して導かれた不織布11が、円筒状支持部材13の外周面に沿って円筒形状に付形され、その外周面に沿って上方に走行する。円筒状支持部材13の外側で回転するターンテーブル14にはボビン15が多数取り付けられ、ボビン15からのゴムストランド16が円筒状支持部材13上の不織布11に巻き付けられる。これにより、ゴムストランド16がほぼ横方向に配列された横配列体17が不織布11上に形成され、横配列体17が加熱ロール18により不織布11に接合されることで横伸縮性複合シート20が製造される。



【特許請求の範囲】

【請求項1】 不織布上にゴムストランドが接合されており、横方向に伸縮性を有する複合シートの製造方法であって、

前記不織布を円筒形状に付形して支持するための円筒状支持部材と、該円筒状支持部材の中心軸を回転中心として前記円筒状支持部材の外側を回転し、前記円筒状支持部材により支持された不織布上にゴムストランドを案内する糸案内装置とを用意する工程と、

横方向に100%以上の伸度を有する不織布を前記円筒状支持部材の外周面に導いて、前記不織布を前記円筒状支持部材の外周面に沿って連続的に円筒形状に付形する工程と、

円筒形状に付形された前記不織布を前記円筒状支持部材の軸線と平行な方向に走行させると共に、200%以上の伸縮性を有するゴムストランドを前記糸案内装置によって前記円筒状支持部材上の前記不織布へと案内しつつ前記糸案内装置を回転させることにより、円筒形状で走行する前記不織布上に前記ゴムストランドを巻き付ける工程と、

走行する前記不織布に、その上に巻き付けられたゴムストランドを接合する工程と、

前記ストランドが接合された不織布を前記円筒状支持部材から引き離しつつ前記不織布を円筒形状から平面形状に連続的に展開して取り出す工程とを有する横伸縮性複合シートの製造方法。

【請求項2】 不織布上にゴムストランドが接合されており、横方向に伸縮性を有する複合シートの製造方法であって、

前記不織布上に前記ゴムストランドを積層する際に前記ストランドを支持し、横方向に略一定の間隔を置いた状態を保持して互いに同じ方向に走行する一対の糸支持部材と、該一対の糸支持部材の周囲を回転し、前記一対の糸支持部材にゴムストランドを巻き付けるように該ゴムストランドを案内する糸案内装置とを用意する工程と、前記一対の糸支持部材を縦方向に走行させつつ、それらの周囲を回転する前記糸案内装置によって、200%以上の伸縮性を有するゴムストランドを前記一対の糸支持部材に巻き付けることにより、前記一対の糸支持部材の間に前記ゴムストランドがほぼ横方向に配列されてなる横配列体を形成する工程と、

前記横配列体を、横方向に100%以上の伸度を有する不織布に接合して横伸縮性複合シートを作製する工程とを有する横伸縮性複合シートの製造方法。

【請求項3】 不織布上にゴムストランドが接合されており、横方向に伸縮性を有する複合シートの製造方法であって、

前記ゴムストランドを前記不織布上に積層する際に前記ゴムストランドを支持するように横方向に間隔を置いて配置されると共に、支持するゴムストランドを縦方向に

移動させるために該ゴムストランドと係合する係合部を各々が有し、該係合部に係合したゴムストランドを縦方向に移動させるために各々が回転する一対の支持部材と、該一対の支持部材の周囲で回転し、各々の前記支持部材の係合部にゴムストランドを係合させて前記一対の支持部材にゴムストランドを巻き付けるようにゴムストランドを案内する糸案内装置とを用意する工程と、

200%以上の伸縮性を有するゴムストランドを、回転する前記糸案内装置により前記一対の支持部材に巻き付けて該ゴムストランドを前記係合部に係合させつつ、前記係合部に係合したゴムストランドを前記支持部材の各々の回転動作に伴って移動させることにより、前記一対の支持部材の間に前記ゴムストランドがほぼ横方向に配列されてなる横配列体を形成する工程と、

前記一対の支持部材が回転することにより移動する前記横配列体を、横方向に100%以上の伸度を有する不織布に接合して横伸縮性複合シートを作製する工程とを有する横伸縮性複合シートの製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、不織布上に横方向にゴムストランドを配してなる横伸縮性複合シートの製造方法に関する。特に、本発明は、ゴムストランドを支持部材に巻き付けていくという簡便な手段によりストランドの横配列体を作製し、そのストランドを、横方向に少なくとも100パーセント以上の伸度を有する不織布上に接合することによる横伸縮性複合シートの製造方法に関する。その製法により製造された横伸縮性複合シートは特に、伸縮性包帯、サポータ、衣類の袖口、オムツなどの伸縮弾性部などの衣料、医療、衛生材料などに使用される。

【0002】

【従来の技術】不織布と弾性体とが積層されてなる伸縮性複合シートに関しては、特開平3-213543号公報や特開平8-174764号公報などに記載されているように、従来から種々の技術が提案されている。特開平3-213543号公報に記載された弾性体の製造方法では、まず、上面の不織布と下面の不織布との間にゴム糸、平ゴムなどの細帯状の弾性体を長手方向に伸長状態で供給する。そして、上面の不織布と下面の不織布とを不織布の接着性を利用して部分的に接着して、上面の不織布について接着部分と非接着部分とをそれぞれ多数形成する。これにより、伸長状態の弾性体が上面および下面の不織布と一体化されてなる弾性体を作製される。

【0003】特開平8-174764号公報には、伸縮方向が規制された複合体が記載されている。その複合体は、延伸長繊維ウェブに伸縮性エラストマー層が積層されてなるものである。延伸長繊維ウェブは、熱可塑性樹脂を紡糸して形成された長繊維ウェブを一方方向に延伸し、そのウェブの繊維をほぼ一方方向に配列させたもので

ある。このようにして、伸縮方向が規制された複合体が構成されたことにより、風合いが良く、適度の伸縮性を有する伸縮性複合シートが得られる。

【0004】

【発明が解決しようとする課題】しかしながら、近年には、オムツなどの衣料用材料の発達により、高品質でありながら安価で、かつ高い生産性で伸縮性複合シートを作製することが可能な製造方法が求められてきた。そのためには、使用するエラストマーを有効に利用することや、製造プロセスが簡便であること、伸縮性複合シートを高速に製造することが求められてきた。

【0005】本発明の目的は、横方向に伸縮性を有する横伸縮性複合シートを製造する際に、使用する弾性体を有効に利用することができ、簡便な製造プロセスで横伸縮性複合シートを高速に製造することが可能な、横伸縮性複合シートの製造方法を提供することにある。

【0006】

【課題を解決するための手段】上記目的を達成するために、本発明は、不織布上にゴムストランドが接合されてなり、横方向に伸縮性を有する複合シートの製造方法であって、前記不織布を円筒形状に付形して支持するための円筒状支持部材と、該円筒状支持部材の中心軸を回転中心として前記円筒状支持部材の外側を回転し、前記円筒状支持部材により支持された不織布上にゴムストランドを案内する糸案内装置とを用意する工程と、横方向に100%以上の伸度を有する不織布を前記円筒状支持部材の外周面に導いて、前記不織布を前記円筒状支持部材の外周面に沿って連続的に円筒形状に付形する工程と、円筒形状に付形された前記不織布を前記円筒状支持部材の軸線と平行な方向に走行させると共に、200%以上の伸縮性を有するゴムストランドを前記糸案内装置によって前記円筒状支持部材上の前記不織布へと案内しつつ前記糸案内装置を回転させることにより、円筒形状で走行する前記不織布上に前記ゴムストランドを巻き付ける工程と、走行する前記不織布に、その上に巻き付けられたゴムストランドを接合する工程と、前記ストランドが接合された不織布を前記円筒状支持部材から引き離しつつ前記不織布を円筒形状から平面形状に連続的に展開して取り出す工程とを有する。

【0007】上記の発明では、まず、横方向に100%以上の伸度を有する不織布を円筒状支持部材に導き、その不織布を円筒状支持部材の外周面に沿って円筒形状に付形して、円筒状支持部材によって支持する。円筒形状の不織布を円筒状支持部材の軸線と平行な方向に走行させると共に、200%以上の伸度を有するゴムストランドを糸案内装置によって円筒状支持部材上の不織布へと案内しつつ糸案内装置を円筒状支持部材の周囲に回転させる。これにより円筒形状の不織布上にゴムストランドが巻き付けられ、次に、そのゴムストランドを不織布に接合することによって横伸縮性複合シートが作製され

る。次に、ゴムストランドが接合された不織布を円筒状支持部材から引き離しつつ円筒形状から平面形状に連続的に展開して取り出すことにより、フラットな横伸縮性複合シートが得られる。このような方法によれば、ゴムストランドの材料が最小の量でも最も効率良く伸縮性を発揮できる横伸縮性複合シートを簡便かつ高速な方法で製造できるので、横伸縮性複合シートを低コストで量産することが可能となる。また、複数の糸案内装置を用いることにより、不織布上でゴムストランド同士が斜交した横伸縮性複合シートを作製した場合、そのシートでは、初期の引張張力が小さく、まろやかな加重伸張曲線になるというメリットもある。

【0008】また、本発明は、不織布上にゴムストランドが接合されてなり、横方向に伸縮性を有する複合シートの製造方法であって、前記不織布上に前記ゴムストランドを積層する際に前記ストランドを支持し、横方向に略一定の間隔を置いた状態を保持して互いに同じ方向に走行する一対の糸支持部材と、該一対の糸支持部材の周囲を回転し、前記一対の糸支持部材にゴムストランドを巻き付けるように該ゴムストランドを案内する糸案内装置とを用意する工程と、前記一対の糸支持部材を縦方向に走行させつつ、それらの周囲を回転する前記糸案内装置によって、200%以上の伸縮性を有するゴムストランドを前記一対の糸支持部材に巻き付けることにより、前記一対の糸支持部材の間に前記ゴムストランドがほぼ横方向に配列されてなる横配列体を形成する工程と、前記横配列体を、横方向に100%以上の伸度を有する不織布に接合して横伸縮性複合シートを作製する工程とを有する。

【0009】上記の発明では、一対の糸支持部材を、横方向にはほぼ一定の間隔を置いた状態を保持して縦方向に走行させると共に、それらの糸支持部材の周囲に糸案内装置を回転させつつ、200%以上の伸縮性を有するゴムストランドを一対の糸支持部材に巻き付けていく。これにより、一対の糸支持部材の間にゴムストランドがほぼ横方向に配列されてなる横配列体が形成される。次に、その横配列体を、横方向に100%以上の伸度を有する不織布に接合することにより、横伸縮性複合シートが作製される。このような方法によっても、上記のように円筒状支持部材を用いた方法と同様に、ゴムストランドの材料が最小の量でも最も効率良く伸縮性を発揮できる横伸縮性複合シートを簡便かつ高速な方法で製造でき、横伸縮性複合シートを低コストで量産することが可能となる。

【0010】さらに、本発明は、不織布上にゴムストランドが接合されてなり、横方向に伸縮性を有する複合シートの製造方法であって、前記ゴムストランドを前記不織布上に積層する際に前記ゴムストランドを支持するように横方向に間隔を置いて配置されると共に、支持するゴムストランドを縦方向に移動させるために該ゴムスト

ランドと係合する係合部を各々が有し、該係合部に係合したゴムストランドを縦方向に移動させるために各々が回転する一対の支持部材と、該一対の支持部材の周囲で回転し、各々の前記支持部材の係合部にゴムストランドを係合させて前記一対の支持部材にゴムストランドを巻き付けるようにゴムストランドを案内する糸案内装置とを用意する工程と、200%以上の伸縮性を有するゴムストランドを、回転する前記糸案内装置により前記一対の支持部材に巻き付けて該ゴムストランドを前記係合部に係合させつつ、前記係合部に係合したゴムストランドを前記支持部材の各々の回転動作に伴って移動させることにより、前記一対の支持部材の間に前記ゴムストランドがほぼ横方向に配列されてなる横配列体を形成する工程と、前記一対の支持部材が回転することにより移動する前記横配列体を、横方向に100%以上の伸度を有する不織布に接合して横伸縮性複合シートを作製する工程とを有する。

【0011】上記の発明では、ゴムストランドを縦方向に移動させるために回転する一対の糸支持部材を用いて横伸縮性複合シートを作製する。糸支持部材は、ゴムストランドと係合する係合部を有しており、その係合部に係合したゴムストランドが糸支持部材の回転動作に伴って一方方向に移動させられる。まず、一対の糸支持部材を、横方向に間隔を置いて配置し、それらの周囲を回転する糸案内装置によって、200%以上の伸縮性を有するゴムストランドを案内して一対の糸支持部材に巻き付け、そのゴムストランドを糸支持部材の係合部に係合させる。そのように一対の糸支持部材にゴムストランドを巻き付けつつ、係合部に係合したゴムストランドを糸支持部材の回転動作によって縦方向に移動させる。これにより、一対の糸支持部材の間にゴムストランドがほぼ横方向に配列されてなる横配列体が形成され、次に、形成された横配列体を、横方向に100%以上の伸度を有する不織布に接合することにより、横伸縮性複合シートが製造される。このような方法によっても、ゴムストランドの材料が最小の量でも最も効率良く伸縮性を発揮できる横伸縮性複合シートを簡便かつ高速な方法で製造でき、横伸縮性複合シートを低コストで量産することが可能となる。

【0012】本発明において、横伸縮性複合シートの製造工程や、不織布のファイバーの配列方向などを説明する場合などに用いる「縦方向」とは、横伸縮性複合シートや不織布を製造する際のそれらの送り方向を意味し、ゴムストランドの配列方向、不織布の伸度、横伸縮性複合シートの伸縮方向等を説明する場合などに用いる「横方向」とは、縦方向と直角な方向、すなわち不織布や横伸縮性複合シートの幅方向を意味する。

【0013】本発明における「伸度」は、JIS-L1095に準ずる。すなわち、幅が5cmのウェブを長さ方向に10cmの間隔をあけて把持して引張速度30c

m/minで引っ張り、ウェブが破断したときの元の長さに対する伸びを%で表したものである。

【0014】本発明における「ストランド」とは、通常、フィラメントと呼ばれる比較的細いエンドレスまたは準エンドレスの可撓性材料の他、比較的太いエンドレスまたは準エンドレスの可撓性材料も含めたものである。フィラメントという場合は、その繊度は、大きい場合でも数百tex程度であるが、本発明における「ストランド」は、繊度が数千texのものも含まれる。なお、「ストランド」は、個々の細いストランドが集合して太いストランドを構成する場合もあり、その場合には、その太いストランドの繊度を、構成する個々のストランドの繊度と区別するためにトータル繊度と呼ぶ場合がある。

【0015】本発明における「ストランドの伸縮性」とは、ストランドに張力をかけて一定の伸びを与えた後、その張力を解除するとその伸びがゴム弾性的に元の長さ近傍に回復する性質をいう。ストランドが弾性的に回復する割合としては、完全に元の長さに戻る必要はないが、ストランドに与えた伸度の少なくとも50%、好ましくは80%（残留伸度20%）、より好ましくは90%以上（残留伸度10%以下）回復すればよい。

【0016】

【発明の実施の形態】次に、本発明の実施の形態について図面を参照して説明する。

【0017】図1は、本発明の製造方法により作製された横伸縮性複合シートを示す平面図である。

【0018】図1(a)に示される横伸縮性複合シートは、矢印Aで示される縦方向に延びる不織布1上に、その縦方向（長さ方向）に対して直角な横方向に配列されたゴムストランド2aが積層かつ接合されてなるものである。不織布1は、その長さ方向（縦方向）にファイバーが配列されてなるものであり、横方向（幅方向）に100%以上の伸度を有している。ゴムストランド2aは、その長さ方向に200%以上の伸縮性を有している。この場合、ストランド2aは、不織布1の横方向とほぼ平行になっており、横方向と平行な直線とで成す角度がほぼゼロとなっている。

【0019】図1(b)に示される横伸縮性複合シートは、不織布1上に積層されたゴムストランド2bが横方向に対していくらか斜行して配列された場合のものであり、図1(b)では、ゴムストランド2bの斜行の程度が、横方向と平行な直線とのなす角度のうち小さい方の角度 α で示してある。本発明では、角度 α が45度より小さいことが望ましく、さらに望ましくは30度以下、最も望ましいのは10度以下である。

【0020】図1(c)に示される横伸縮性複合シートは、図1(b)に示した横伸縮性複合シートにおいてゴムストランド2bと斜交するゴムストランド2cが不織布1上にさらに積層かつ接合されて構成されたものであ

る。図1(c)に示した場合では、ゴムストランド2cが横方向に対していくらか斜行して配列されており、その斜行の程度が、図1(c)では横方向と平行な直線とのなす角度のうち小さい方の角度 β で示してある。ゴムストランド2cは、必ずしも横方向に対して斜行していなくともよく、横方向とほぼ平行になっていてもよい。ゴムストランド2b、2cのそれぞれの斜行角度 α 、 β が等しい必要はないが、それぞれの斜行角度が45度以下であることが望ましい。

【0021】図1(a)～図1(c)に示したそれぞれの横伸縮性複合シートは、横方向に大きな伸縮性を有しており、伸縮性包帯、サポータ、衣類の袖口、伸縮テープ、ストレッチベルト、ブラジャーの肩紐、腹巻、妊婦帯、手袋や靴下のほすれ止め、オムツや失禁パッドなどの衛生材料の伸縮弾性部などの衣料、医療などに好適に使用される。

【0022】図2は、本発明の横伸縮性複合シートの製造方法が適用された装置を示す斜視図である。

【0023】本実施形態の横伸縮性複合シートの製造装置では、図2に示すように支持部材14bにより固定されたリング状の固定テーブル14aの上面に、リング状のターンテーブル14が支持機構14cを介して取り付けられている。固定テーブル14aおよびターンテーブル14の各中心軸は共に、鉛直方向と平行な同一直線上に配置されている。ターンテーブル14が、その中心軸を回転中心として固定テーブル14a上で回転可能となるように支持機構14cによって支持されている。ターンテーブル14の上面には、ゴムストランド16が巻かれているボビン15が回転可能に多数取り付けられている。図2では、簡便のためにボビン15が2つだけ示されているが、多数のボビン15がターンテーブル14の円周方向に沿ってターンテーブル15の上面に配列されている。これら多数のボビン15、およびターンテーブル14などから糸案内装置が構成され、その装置によってゴムストランド16が円筒状支持部材13上の不織布11の外側面へと案内される。ゴムストランド16はその長さ方向に200%以上の伸縮性を有している。

【0024】ターンテーブル14の外周面には、ベルト28がはめ込まれる溝が形成されている。ベルト28は、ターンテーブル14の外周面に形成された溝と、シャフト26の一端部に取り付けられたプーリ27とに掛けられている。シャフト26の他端部にはギア25bが取り付けられ、ギア25bが、モータ24の回転軸に取り付けられたギア25aと噛み合っている。モータ24の駆動動作に伴ってモータ24の動力がギア25a、25b、シャフト26、プーリ27、およびベルト28を介してターンテーブル14に伝えられ、ターンテーブル14が回転させられる。

【0025】また、本実施形態の製造装置には、固定テーブル14aおよびターンテーブル14の内側を通る円

筒状支持部材13が備えられている。円筒状支持部材13は、その中心軸が固定テーブル14aおよびターンテーブル14の中心軸と同一直線上に配置されるように固定されている。円筒状支持部材13の、固定テーブル14aよりも下側の部分の近傍には、円筒状支持部材13へと送り込まれる帯状の不織布11を案内するガイド12が設けられている。ガイド12は、平面形状の不織布11が円筒状支持部材13の外周面に沿って円筒形状にフォーミングされるように不織布11を円筒状支持部材13の外周面へと導く湾曲面を有している。円筒状支持部材13は、円筒形状に付形された不織布11の内側面に接することで不織布11を円筒形状の状態で支持するためのものである。不織布11は、ファイバーが縦方向に配列されてなるものであり、横方向すなわちその幅方向に100%以上の伸度を有している。

【0026】円筒状支持部材13の、ターンテーブル14よりも上側には、円筒状支持部材13の外周面に接している不織布11上にボビン15からのゴムストランド16を接合するための加熱ロール18が多数設けられている。複数の加熱ロール18は、円筒状支持部材13の円周方向に沿って並べられており、各々の加熱ロール18が、その中心軸が鉛直方向に対して直角になった状態で回転可能に支持されている。各加熱ロール18と円筒状支持部材13との間に不織布11およびゴムストランド16が挟み込まれ、それらが加熱ロール18によって加熱されることにより、不織布11上にゴムストランド16が接合される。

【0027】さらに、円筒状支持部材13の、加熱ロール18よりも上側には、不織布11の幅方向端部の近傍でゴムストランド16を切断する切断手段としてのナイフ21と、ナイフ21によりゴムストランド16を切断した後に不織布11を円筒形状から平面形状に展開するように案内する案内具22とが設けられている。案内具22に近傍には、案内具22によって導かれた不織布11を引き取る一対のニップロール23a、23bが配置されている。これらのニップロール23a、23bは、製造装置内で不織布11を搬送するための搬送手段であり、これらのロールによる不織布11の引き取り動作によって、搬送経路の上流側で不織布11がガイド12へと供給される。円筒状支持部材13上では、その外周面に沿って円筒形状に付形された不織布11が、その円筒形状の軸線方向と平行な方向、すなわち縦方向に円筒状支持部材13の外周面に沿って走行させられる。

【0028】次に、図2に示した製造装置の動作について説明する。

【0029】まず、ガイド12へと送り込まれた不織布11はガイド12によって円筒状支持部材13の外周面に連続的に巻き付けられていく。これにより、不織布11が円筒状支持部材13の外周面に沿って円筒形状に付形され、その円筒形状を保持した状態で、不織布11が

上方に向かって縦方向に円筒状支持部材13上を移動する。円筒状支持部材13上を移動する不織布11の一部の周囲では、モータ24によってターンテーブル14が回転している。このターンテーブル14の回転にしたがってボビン15からゴムストランド16が解け、解けたゴムストランド16が円筒状支持部材13上の不織布11に巻き付いていく。これにより、ゴムストランド16がほぼ横方向に配列されてなる横配列体17が、円筒状支持部材13上、すなわちその部材上の不織布11の上に形成される。

【0030】ゴムストランド16の材質が熱可塑性エラストマーである場合には、円筒状支持部材13との間に不織布11およびゴムストランド16を挟み込んで回転している加熱ロール18により、不織布11とゴムストランド16との接合部19が部分的に形成される。加熱ロール18は、図2では図示していないが、モータなどの駆動手段によって回転駆動されていることが望ましい。

【0031】多数の加熱ロール18によって不織布11とゴムストランド16とが部分的に接合されてなる横伸縮性複合シート20は、不織布11の幅方向両端部の近傍でナイフ21によりゴムストランド16が切り離された後に、円筒状支持部材13から引き離されて案内具22により円筒形状から平面形状へとフラットに連続的に展開されて戻される。このようにして円筒状支持部材13から取り出された横伸縮性複合シート20はニップロール23a、23bにより引き取られていく。

【0032】不織布11上にゴムストランド16が部分的に接合された横伸縮性複合シート20は、フラットにされた後にさらにその全体で不織布11とゴムストランド16を接合して一体化する場合が多い。

【0033】図2ではターンテーブル14が一つの例を示したが、製造装置にターンテーブル14を2つ設け、2つのターンテーブル14を互いに逆方向に回転させることにより、図1(c)に示したようにゴムストランド同士が互いに斜交した斜交ゴム配列体を作製できる。そして、その斜行ゴム配列体を不織布11上に積層することにより、図1(c)に示した構成の横伸縮性複合シートが製造される。この製造装置では、不織布11の送り速度と、ターンテーブル14の回転速度とを調整することにより、不織布11上に積層されるゴムストランド16を横方向とほぼ平行にしたり、横方向に対して斜行させたりすることができる。

【0034】なお、図2では、ゴムストランド16の材質が熱可塑性エラストマーである場合の装置を示したが、ゴムストランド16の材質が、熱可塑性を示さない天然ゴムなどである場合には、ゴムストランド16がボビン15から繰り出された時点でゴムストランド16に接着剤をスプレーして塗布するなど、ゴムストランド16への接着剤供給手段が必要とされる。

【0035】図3は、本発明の横伸縮性複合シートの製造方法が適用された装置の他の例を示す斜視図である。

【0036】図3に示される製造装置では、横方向に間隔を置いて互いに平行な状態で張られた一対のベルト状の糸支持部材31を循環させ、それら一対の糸支持部材31にゴムストランド16aを巻き付けることで横配列体34を作製する。そして、横配列体34を不織布に接合することで横伸縮性複合シートを37が製造される。この製造装置では、一対の糸支持部材31のうち一方の糸支持部材31が、シャフト41aの一端部に取り付けられたベルト車42a、シャフト41bの一端部に取り付けられたベルト車42b、シャフト41cの一端部に取り付けられたベルト車42c、およびロール50の一端部によって張られている。他方の糸支持部材31は、シャフト41aの他端部に取り付けられたベルト車42a、シャフト41bの他端部に取り付けられたベルト車42b、シャフト41cの他端部に取り付けられたベルト車42c、およびロール50の他端部によって張られている。

【0037】一方のベルト車42cにはギア46cが取り付けられており、そのギア46cと噛み合うギア46bがモータ46bの回転軸に取り付けられている。モータ46bを回転駆動させることで、そのモータ46bの動力がギア46b、46cを介してシャフト41c、およびシャフト41cの両端のベルト車42cに伝えられる。これにより、シャフト41および一対のベルト車42cが回転し、一対の糸支持部材31の間に横方向にほぼ一定の間隔が置かれた状態で、それぞれの糸支持部材31が同じ速度で縦方向に走行させられる。

【0038】一対の糸支持部材31におけるベルト車42aとロール50の間の部分は、それらの糸支持部材31にゴムストランド16aを巻き付けるための機構を構成するリング32の内側を通過している。リング32の中心軸は、その内側を通過する糸支持部材31の走行方向と平行となっている。このリング32が、その外周面に接する複数のローラ49によってリング32の中心軸を回転中心として回転可能に支持されている。リング32の内周面には、その円周方向に並ぶ内歯32aが形成されている。その内歯32aには、モータ46aの回転軸と繋がる軸に取り付けられたギア45aが噛み合っている。モータ46aの動力がギア45aおよび内歯32aによってリング32に伝えられることにより、リング32が一対の糸支持部材31の各一部の周囲を回転する。

【0039】また、リング32には、その内側に位置するボビン33が多数取り付けられている。それぞれのボビン33はシャフト33aによってリング32に回転可能に取り付けられている。図3では、簡便のためにボビン33が1つだけ示されているが、多数のボビン33がリング32の内周面上にその円周方向に沿って並べられている。それぞれのボビン33にはゴムストランド16

aが巻かれている。ゴムストランド16aはその長さ方向に200%以上の伸縮性を有している。さらに、リング32の内周面には、ボビン33から巻き出されるゴムストランド16aを案内するための小穴が形成された案内部材53が、各ボビン33に対応して複数取り付けられている。これらリング32、多数のボビン33、および案内部材53などから、一対の糸支持部材31の周囲を回転する糸案内装置が構成されている。その糸案内装置によって、ゴムストランド16aが一対の糸支持部材31にゴムストランド16aを巻き付けられるようにゴムストランド16aが案内される。

【0040】一対の糸支持部材31において、ゴムストランド31が巻き付けられる部分、およびその近傍には、糸支持部材31の間隔が狭くなることを防止するようにそれぞれの糸支持部材31に係合するテーブル48が設けられていても良い。テーブル48には、その幅を調節するための調節ボルト48bが取り付けられている。また、テーブル48bの両側面には、糸支持部材31が滑動可能に係合する溝48aが形成されている。調節ボルト48bによってテーブル48の幅を調節することにより、それぞれの糸支持部材31が溝48aに係合した状態が保持されている。

【0041】糸支持部材31の走行方向におけるリング32よりも上流側には、一対の糸支持部材31の間の空間に不織布11aを供給するためのロール43bが配置されている。不織布11aは、縦方向にファイバーが配列されてなるものであり、横方向に100%以上の伸度を有している。ロール43bの上方には、そのロール43bに向けて不織布11aを送り出すためのロール43aが配置されている。また、糸支持部材31の走行方向におけるリング32よりも下流側では、一対の糸支持部材31の上側で加熱シリンダ35aおよびロール44aによって張られた離型シート36aが走行し、かつ、一対の糸支持部材31の下側で加熱シリンダ35bおよびロール44bによって張られた離型シート36bが走行している。加熱シリンダ35aと35bとの間に離型シート36a、36bが挟み込まれるようにそれぞれの加熱シリンダが配置されている。加熱シリンダ35a、35bのそれぞれの両端部には糸支持部材31がはまり込む溝が形成されている。さらに、一対の糸支持部材31の上方には、離型シート36aと36bの間に上側から不織布11bを送り込むためのロール43cが配置されている。加熱シリンダ35aよりも下側には、離型シート36aと36bの間に下側から不織布11cを送り込むためのロール43d、43eが配置されている。不織布11b、11cも、縦方向にファイバーが配列されてなるものであり、横方向に100%以上の伸度を有している。

【0042】ゴムストランド16aの材質は熱可塑性エラストマーであり、ゴムストランド16aを不織布11

a、11b、11cのそれぞれに接合するために、加熱シリンダ35a、35b、および離型シート36a、36bが設けられている。ロール44a、44bと加熱シリンダ35a、35bとによって循環されている離型シート36a、36bが、糸支持部材31と同速で走行するようになっている。これにより、不織布11a~11cとゴムストランド16aとの接合が加熱シリンダ35a、35bのニップによって離型シート36a、36b間で行われる。

【0043】ロール50の上方には、そのロールと共に回転する回転ナイフ47を両端に備えたシャフトが配置されている。そのシャフトに備えられた一対の回転ナイフ47は、糸支持部材31に巻き付けられたゴムストランド16aを、それぞれの糸支持部材31の近傍で切断するためのものである。一対の回転ナイフ47を備えたシャフトの近傍にはロール43fが配置されており、後述するように回転ナイフ47によってゴムストランド16aを切断することで糸支持部材31から離脱した横伸縮性複合シート37が、ロール43fを経由して巻取ロール38へと送り出される。横伸縮性複合シート37は、後述するように不織布11aにゴムストランド16aおよび不織布11b、11cが積層されて構成されている。巻取ロール38は、不図示の回転駆動装置によって回転させられており、巻取ロール38に横伸縮性複合シート37が巻き取られる。巻取ロール38を回転させる駆動装置は、不織布11a、11b、11cを製造ラインに沿って搬送するための搬送手段であり、巻取ロール38による横伸縮性複合シート37の引き取り動作により、製造ラインに不織布11a、11b、11cのそれぞれが供給される。

【0044】次に、上記のように構成された製造装置の動作について説明する。

【0045】まず、一対の糸支持部材31を縦方向に走行させつつ、それら糸支持部材31の間の空間にロール43a、43aによって不織布11aを供給する。不織布11aおよび一対の糸支持部材31は、回転している捕集リング32の内側を通過する。その通過の際に、リング32の回転に従い、各ボビン33からのゴムストランド16aが一対の糸支持部材31や不織布11aに巻き付けられる。これにより、一対の糸支持部材31の間にゴムストランド16aが横方向に配列されてなる横配列体34が不織布11aの上側および下側のそれぞれに形成される。

【0046】横配列体34および不織布11aは、その上側から供給された不織布11bと、下側から供給された不織布11cと共に、加熱シリンダ35a、35bによって離型シート36aと36bの間、すなわち加熱シリンダ35aと35bの間に挟み込まれる。これにより、それらの加熱シリンダによって横配列体34が不織布11a、11b、11cのそれぞれに接合され、それ

らが積層されてなる横伸縮性複合シート37が作製される。この伸縮性複合シート37では、不織布11aの上面に横配列体34を介して不織布11bが接合され、不織布11aの下面に横配列体34を介して不織布11cが接合された積層構造となっている。

【0047】その後、横配列体34の横方向両端部が、ロール50と回転ナイフ47との間に挟み込まれることで、ゴムストランド16aが糸支持部材31の近傍で回転ナイフ47によって切断される。これにより、横伸縮性複合シート37が一对の糸支持部材31のそれぞれから切り離され、離された横伸縮性複合シート37がロール43fを経由して巻取ロール38に巻き取られる。横伸縮性複合シート37から分離されて糸支持部材31に付着したままのゴムストランド16aは、除去部材51によって糸支持部材31から除去される。

【0048】図3の製造装置では、リング32やボビン33からなる糸案内装置が一つの例を示したが、その糸案内装置を2つ設け、それらの糸案内装置を互いに逆方向に回転させることにより、図1(c)に示したようにゴムストランド同士が互いに斜交した斜交ゴム配列体を作製できる。そして、その斜行ゴム配列体を不織布に積層することにより、図1(c)に示した構成の横伸縮性複合シートが製造される。この製造装置では、糸支持部材31の走行速度と、リング32の回転速度とを調整することにより、ボビン33から繰り出されるゴムストランド16aを横方向とほぼ平行にしたり、横方向に対して斜行させたりすることができる。

【0049】図3に示した製造装置では、不織布11aは、ゴムストランド16aが糸支持部材31に巻き付けられる箇所の上流側で製造ラインに供給される。このような場合に、不織布11aの供給経路に2枚の不織布を重ね合わせて供給すると、1つの製造工程で2枚の横伸縮性複合シートが製造される。また、製造ラインにおいてリング32の上流側で不織布11aを供給し、不織布11b、11cを製造ラインに供給しない場合には、不織布11aの両側にゴムストランド16aが接合された横伸縮性複合シートが製造される。

【0050】さらには、不織布11a~11cのうち不織布11a、11cを供給せずに不織布11bのみを製造ラインに供給してもよいし、あるいは、不織布11a、11bを供給せずに不織布11cのみを供給してもよい。この場合には、ゴムストランド16aが糸支持部材31に巻き付けられた後に不織布11bまたは11cの片側にゴムストランド16aが接合された横伸縮性複合シートが製造される。また、不織布11aを供給せずに不織布11bと11cを供給すると、2枚の不織布11b、11cの間にゴムストランド16aが挟まれた横伸縮性複合シートが製造される。

【0051】図3では、一对の糸支持部材31のそれぞれが循環している例を示したが、必ずしも糸支持部材が

循環している必要はない。例えば、糸支持部材として強度のある糸を用い、その糸を製品と一緒に走行させてもよい。その場合には、支持用の糸は、最終の製品が作製された段階で除去される。このような方式の製造は、縦方向に寸法安定性のない不織布11a、11b、11cを用いた場合に、より適合する場合がある。

【0052】また、図3では、糸支持部材31として、循環するケーブルを用いた例を示したが、必ずしも循環ケーブルを用いる必要はなく、一枚のシート状の循環ベルトを糸支持部材として用いてもよい。なお、図3でも、ゴムストランド16aの材質が熱可塑性エラストマーである場合の装置の例を示したが、ゴムストランド16aの材質が、熱可塑性を示さない天然ゴムなどである場合には、ゴムストランド16aがボビン33から繰り出された時点でゴムストランド16aに接着剤をスプレーして塗布するなど、ゴムストランド16aへの接着剤の供給手段が必要とされる。

【0053】図4は、本発明の横伸縮性複合シートの製造方法が適用された装置のさらに他の例を示す側面図である。図5は、図4に示される製造装置の上面図であり、図6は、図4および図5に示される糸支持部材を拡大して示した側面図である。

【0054】図4および図5に示される製造装置では、一对の、細長い管状の糸支持部材71が横方向に間隔を置いて互いに平行に配置されている。各々の糸支持部材71は、その両端部に取り付けられた一对の軸受け91によってフレーム82上に回転可能に取り付けられている。これらフレーム82および軸受け91によって各々の糸支持部材71が支持されている。これらの糸支持部材71は、後述する機構によって互いに同じ方向に回転する。

【0055】一对の糸支持部材71の各々の端部にゴムストランド16bを巻き付けるための糸案内装置72は、不図示の支持機構によって、糸支持部材71と平行な回転軸を中心に回転可能に支持されている。この糸案内装置72は、後述する機構によって一对の糸支持部材71の周囲で回転させられる。ゴムストランド16bは、その長さ方向に200%以上の伸縮性を有している。糸案内装置72は、中空軸72a、垂直部分72b、平行部分72c、および先端部73dの順で連続して延びる配管部材からなるものである。糸案内装置72の回転中心に中空軸72aが配置されており、中空軸72aの外周面にはスプロケット84dが設けられている。垂直部分72bは、中空軸72aに対してほぼ垂直な方向に延び、平行部分72cは、中空軸72aと平行な方向に延びている。先端部73dは、平行部分72cから糸案内装置72の回転中心に向かって延びており、一对の糸支持部材71の周囲を回転させられる。

【0056】糸案内装置72の中空軸72a内には、ゴムストランド16bが巻かれたボビン75より、そのゴ

ムストランド16bが繰り出される。中空軸72aに供給されたゴムストランド16bは、糸案内装置72内に案内されてから先端部73dから繰り出され、糸案内装置72の回転により一対の糸支持部材71に巻き付けられる。中空軸72aとボビン72との間には、穴87aが形成された案内板87が配置されており、ボビン72からのゴムストランド16bが穴87aを通して中空軸72a内に送り込まれる。中空軸72aと垂直部分72bとの接続部には、糸案内装置72の、中空軸72aを除いた部分との釣り合わせのために、平行部分72bと平行な取付棒93によって鍾92が取り付けられている。

【0057】図6に示すように、一対の糸支持部材71のそれぞれの外周面には、その部材に巻き付けられたゴムストランド16bが係合する係合部としてのスクリュウ溝74aが、糸支持部材71の長さ方向一端部から他端部に渡って形成されている。スクリュウ溝74aは、その溝にはめ込まれたゴムストランド16bを糸支持部材71の回転動作に伴って、糸支持部材71の長さ方向、すなわち縦方向に移動させるためのものである。また、それぞれの糸支持部材71には、それを回転させるための歯車86aが備えられており、それぞれの歯車86aの外周面には、スクリュウ溝74aの一部と重なったスクリュウ溝74bが形成されている。このような構成の一対の糸支持部材71では、図5に示すようにそれらの間にゴムストランド16bが横方向に配列されてなる横配列体73が各糸支持部材71の回転動作に伴って形成され、その横配列体73が縦方向に搬送させられる。このとき、糸支持部材71上を搬送されるゴムストランド16bは、軸受け91の内側や歯車86aを通過する際に、スクリュウ溝74aおよび74bの構成により、糸支持部材71以外の部材に接触することなく、縦方向に移送される。

【0058】一対の糸支持部材71の間には、横配列体73を挟み込んで回転する一対のニップロール76a、76bが配置されている。また、ニップロール76a、76bの上側には、それらのロール間に上側から不織布11dを供給するためのロール81aが配置され、ニップロール76a、76bの下側には、それらのロール間に下側から不織布11eを供給するためのロール81bが配置されている。このような構成では、ニップロール76a、76bによって不織布11dと11eとの間に横配列体73を挟み込ませてそれらを積層することができ、これにより、横配列体73および不織布11d、11eからなる横伸縮性複合シート77が作製される。不織布11d、11eのそれぞれは、ファイバーが縦方向に配列されてなるものであり、横方向（幅方向）に100%以上の伸度を有している。

【0059】一対の糸支持部材71から送り出された横伸縮性複合シート77の移動方向下流側には、ロール8

1cや、そのロールから送り出された横伸縮性複合シートを77を挟み込む加熱シリンダ78aおよびニップロール79aが配置されている。さらにその下流側には、横伸縮性複合シート77を挟み込む加熱シリンダ78bおよびニップロール79bと、それらの間から送り出された横伸縮性複合シート77を、ロール81dを経由して巻き取る巻取ロール81eが配置されている。巻取ロール81eには、それを回転させる回転駆動装置としてのモータ（不図示）が接続されている。横伸縮性複合シート77が加熱シリンダ78a上を通過する際には、そのシリンダに不織布11eが接触するように横伸縮性複合シート77が加熱シリンダ78aの外周面に巻き付けられ、加熱シリンダ78b上を通過する際には、そのシリンダに不織布11dが接触するように横伸縮性複合シート77が加熱シリンダ78bの外周面に巻き付けられる。

【0060】また、この製造装置には、糸案内装置72や各糸支持部材71を回転させるための駆動手段としてモータ83が備えられている。モータ83の回転軸には、糸案内装置72と一方の糸支持部材71を回転させるための回転軸85aが接続されると共に、他方の糸支持部材71を、回転軸85bなどを介して回転させるためのスプロケット84aが取り付けられている。回転軸85aには、モータ83の動力を糸案内装置72に伝えるためのスプロケット84cと、一方の糸支持部材71の歯車86aと噛み合う歯車86bが取り付けられている。スプロケット84cと84dとには、動力を伝えるためのチェーン89aが取り付けられている。一方、回転軸85bの一端にはスプロケット84bが取り付けられ、他端には、他方の糸支持部材71の歯車86aと噛み合う歯車86bとが取り付けられている。スプロケット84aと84bには、動力を伝えるためのチェーン89bが取り付けられている。

【0061】さらに、この製造装置には、糸支持部材71内に供給される糸90が巻き付けられたボビン75aを、必要に応じて備え付けてもよい。ボビン75aから繰り出される糸90は、糸支持部材71において横配列体73の移動方向上流側の開口端から糸支持部材71内に供給され、その部材内を通過する。したがって、糸90は、横配列体73の横方向両端部でゴムストランド16bのループの内側に位置するように糸支持部材71内を通過して搬送される。このようにして横配列体73の両端部に糸90を通すことにより、製造ライン上でゴムストランド16bが糸90によって支持される。その結果、横配列体73においてゴムストランド16bの配列が糸90によって保持され、また、横伸縮性複合シート77の強度が向上する。横伸縮性複合シート77が加熱シリンダ78aや78bを通過する際には、そのシートが加熱シリンダに接着されそうになった場合に、糸90が、横伸縮性複合シート77を加熱シリンダから引き離

す働きをする。

【0062】次に、この製造装置の動作について説明する。

【0063】まず、糸案内装置72の回転動作に伴ってボビン75からゴムストランド16bが繰り出され、そのゴムストランド16bは糸案内装置72を通して糸支持部材71へと供給される。供給されたゴムストランド16bが一对の糸支持部材71に巻き付けられて、それぞれのスクリュウ溝74a内にはめ込まれる。はめ込まれたゴムストランド16bは、各糸支持部材71の回転動作によってその部材の長手方向へとスクリュウ溝74a内を送られていく。そして、糸案内装置72の回転により連続的に供給されたゴムストランド16bにより、一对の糸支持部材71間でゴムストランドの横配列体73が形成される。

【0064】次に、ニップロール76a、76bにより横配列体73の上面に不織布11dが、横配列体73の下面に不織布11eが供給され、それらの不織布が、糸支持部材71の回転により送られた横配列体73と同時にニップロール76a、76b間に挟み込まれる。

【0065】ゴムストランド16bの材質が熱可塑性エラストマーである場合、ニップロール76a、76bが加熱されていることにより、ゴムストランド16bが不織布11d、11eに接合された横伸縮性複合シート77となる。その後、横伸縮性複合シート77が、加熱シリンダ78aとニップロール76aとに挟まれ、さらに、加熱シリンダ78bとニップロール76bとに挟まれることにより、ゴムストランド16bと不織布11d、11eとの接合が強化される。そして、横伸縮性複合シート77は、巻取ロール81eに巻き取られたロール80とされる。

【0066】不織布11d、11eの坪量が小さい場合のように、製造ラインで横伸縮性複合シート77の搬送が困難な場合には、非弾性で高強度の糸90を、上記のように横配列体73の両側の耳部などに挿入し、その糸90により横伸縮性複合シート77の搬送を容易にしてもよい。この場合、糸90が挿入された部分を除去して横伸縮性複合シート77を使用するようにすることができる。

【0067】図4～図6に示した製造装置では、横配列体73の両側に不織布を供給し、不織布11d、11eによってゴムストランド16bが上下からサンドイッチされた横伸縮性複合シートを製造した。これに対して、不織布11d、11eのいずれか一方のみを供給して横配列体73に接合することによって横伸縮性複合シートを製造することもできる。

【0068】図4および図5では、糸案内装置72が一個の場合を示したが、糸供給口を多数設けることで複数本のゴムストランドを供給することや、糸案内装置を多段に設けることにより、横伸縮性複合シートの生産性を

向上させることができる。また、図2や図3の製造装置において説明したのと同様に、ゴムストランド同士が斜交した横伸縮性複合シートを作製するために糸案内装置を多段に設けてもよい。この製造装置では、一对の糸支持部材71に形成されたスクリュウ溝74a、74bの構成や、一对のスクリュウ溝同士の位置関係により、糸案内装置72から繰り出されるゴムストランド16bを横方向とほぼ平行にしたり、横方向に対して斜行させたりすることができる。

【0069】また、図4～図6では、一对の糸支持部材71間に配置されたニップロール76a、76bによりゴムストランド16bを不織布11d、11eと一体化させる例を示したが、一对の糸支持部材71間で横方向に配列したゴムストランド16bの群を、循環する多数の糸などで加熱シリンダ78a上に移し、そのシリンダ上に供給された不織布と一体化させることもできる。

【0070】次に、上述したそれぞれの製造装置で用いられる材料や、その製造装置の特徴などについて詳しく説明する。

【0071】本発明の製造方法において、ゴムストランドの材料すなわち伸縮性エラストマーとして用いられるゴムの種類としては、天然ゴムや合成ゴム、熱可塑性エラストマーをストランド状に成形したものが使用される。かかるゴムストランドとしては、断面形状が丸のものばかりでなく、断面形状が矩形のテープ状のものなど、種々の形状のものが使用され、また、そのストランドがモノフィラメントからなるものであってもよく、フィラメントの集合体であるマルチフィラメントであってもよい。また、図を参照して説明した工程とは別の工程で製造されたストランドばかりでなく、本発明においてゴムストランドを糸支持部材に巻き付ける工程の直前でゴムストランドを紡糸し、引き続いてゴムストランドを支持部材に巻き付けたり、不織布上に積層することで、工程の短縮化を図ることもできる。

【0072】また、上述したそれぞれの製造方法において、弾性体としてストランド状に成形されたものを使用することは、加硫などを施してゴム弾性を最も発揮しやすいよう成形したストランドを使用できるという利点がある。また、複合シートの伸縮方向にストランドを効率的に配置することにより、最小量のゴム弾性体を最も有効に使用するのに適するからである。また、ゴム弾性体は一般に成形性が悪く、特に、200%以上の大きな伸縮を繰返しかけられるオムツの弾性材料など、そのような伸縮適性を必要とされるゴム弾性体は成形性が悪い。そこで、最も単純な成形法であるストランドの成形を採用するのが最も適する。

【0073】上述した製造方法では、ゴムストランドの材質は、上記のように熱可塑性エラストマー、合成ゴム、天然ゴムなどであり、200%以上のゴム弾性的伸縮性を有するストランドが使用される。ただし、ゴムス

トランドが200%伸張した後に回復した場合の残留歪みがゼロであることまで要求するものではなく、数十パーセントの残留歪みを有していても使用できる。

【0074】本発明の製造方法において、ゴムストランドの材質として熱可塑性エラストマーが特に適合する。熱可塑性エラストマーは、ゴムストランドと不織布の接合が熱のみで可能であり、また、プロセスも簡便となることより、格段とコストを安くして横伸縮性複合シートを製造することができる。

【0075】ゴムストランドの熱可塑性エラストマーとしては、ポリオレフィン系、合成ゴム、ポリエステル系、ポリアミド系、ポリウレタン系などのエラストマーが使用される。これらのうち、スチレンとオレフィンが共重合された合成ゴム系やポリウレタン系が高倍率に伸縮し、しかも伸縮時の応力が小さいため、ゴムストランドのエラストマーとして最も適する。なお、ゴムストランドのうち、熱などによる不織布との接合が困難である天然ゴムや加硫合成ゴムなどのストランドは、合成ゴムや天然ゴムなどのラテックスなどで不織布に接着する。

【0076】横伸縮性複合シートの材料となる不織布を構成しているファイバーとは、短繊維（ショートファイバー）と連続フィラメントの両方を意味する広義のファイバーを意味する。そのファイバーは、通常のポリプロピレン、ポリアミド、ポリエステルなどの合成繊維用ポリマーからなるもの、また、綿や絹などの天然繊維のファイバーからなるもの、レーヨンやアセテートなどの半合成繊維のファイバーであってもよい。

【0077】横伸縮性複合シートを製造する際に用いられる不織布は、一定方向に少なくとも100%以上の伸度を有する必要がある。このように100%以上の伸度を有する不織布の例として、特開平8-174764号公報や特開平11-222759号公報に記載されているように、ファイバーが一方に配列した不織布があり、その配列方向と直角方向の不織布の伸度が100パーセント以上となる。

【0078】本発明の製造方法では、不織布の100%以上の伸度は、ファイバーの配列した方向と直角方向であり、ファイバーの配列方向では、伸度が数%から数十%であり、伸張応力も大きく、この方向では寸法安定性のある伸縮性複合シートが得られる。

【0079】伸縮性複合シート用の不織布としては、スパンボンド不織布またはメルトブロー不織布を延伸した不織布や、本発明者らによる先発明の縦延伸不織布（特公平3-36948号公報、特開平10-204767号公報など）に詳述した不織布、またはトウを開織して一方に配列した不織布など、長繊維フィラメントからなる不織布が使用される。これらの長繊維フィラメントは、数百回の繰り返しの伸縮に対しても、繊維の抜け落ちがなく、いわゆるリントフリーな用途に適合する。また、延伸した不織布は延伸方向に強度および寸法安定性

があり、さらに、延伸した不織布は光沢のある不織布となることより、衣料などでこの延伸による特性も利用することができる。

【0080】本発明において、横伸縮性複合シート用の不織布とは、縦方向に延伸された不織布と記載したが、2方向に延伸した不織布であっても、縦方向の延伸倍率を高くすることにより縦横のバランスが崩れている不織布も、本発明の、縦方向（一方）に延伸された不織布に含まれる。

【0081】また、横伸縮性複合シート用の不織布として、一方に短繊維が配列されてなる不織布も適合する。短繊維からなる不織布は、綿的風合いで、感触がよく、肌に直接触れる用途などで好まれる。短繊維からなるファイバーが配列した不織布としてはカード上りのウェブなどがある。

【0082】また、100%以上の伸度を有する不織布の別の例として、スパンボンド不織布や通常の短繊維不織布に、柔軟加工や、収縮加工、あるいは、折り畳み加工およびフリース加工を含むひだ付け加工などを行うことで、横方向に伸度を有するように加工したものであってもよい。

【0083】柔軟加工とは、不織布に柔軟剤を施す狭義の柔軟加工ばかりでなく、サンホライズ加工等の防縮加工や、エンボス加工など見た目にひだが観察されないような物理的手段により、柔らかく伸度の大きな不織布とする加工も含まれる。

【0084】収縮加工とは、布を物理的または化学的に収縮させる加工であり、ファイバーを絡み合わせる縮充加工と呼ばれるものも含み、また、上述した柔軟加工とも一部共通する。布を縦方向または横方向に物理的に収縮させる方法として、例えば、特開平6-57620号公報等に開示された方法がある。

【0085】ひだ付け加工とは、折り畳み加工、フリース加工等を含み、布に規則的または不規則な小さなシワや折量を多数設けて、布に伸張性を付与する加工をいう。横方向にひだを入れて縦方向に伸度を大きくする例として、サンホライズ加工（米国特許第2324245号明細書参照）や、広幅スタフィンボックス（特公平5-41742号公報参照）等の機械的防縮加工や、製紙業界におけるクレープ紙の製造方法を利用した加工、軸方向に多数の溝を有する2本のローラを組み合わせて縦方向にひだを入れる加工等が挙げられる。また、エンボスパターンを工夫することによって、縦方向または横方向に伸縮性のある不織布とすることもできる。いずれの加工であっても、ひだが生じる場合は本明細書でいうひだ付け加工に含まれる。

【0086】横伸縮性複合シート用の不織布は、一方に少なくとも100%以上、望ましくは200%以上の伸度が要求される。不織布の一方の伸度が100%以上であれば、エラストマーとの複合シートとしては20

0%以上の繰り返しての伸縮性を示すことが実験結果から確認できた。

【0087】これらのゴムストランドおよび不織布を用いて横伸縮性複合シートを製造する本発明の方法は、上述したようにゴムストランドがほぼ横方向に配列してなる横配列体を製造するプロセスを有する。

【0088】ゴムストランドの横配列体は、ゴムストランドが横方向、即ち不織布の横方向（幅方向）に配列しているものであり、ゴムストランドが横方向から若干斜行している場合も含まれるが、横方向とゴムストランドのなす角度の小さい方の角度が45度より小さい場合のものをいう。

【0089】ゴムストランドが上記のような横配置をとる利点は、簡便な手段でストランドを目的の方向に有効に配置できる点にある。また、最小のストランド量で横方向の伸縮性を与えることができる。また、ゴムストランドが若干斜行している場合や交差している場合は、その斜めの程度により、横伸縮性複合シートの伸張張力を調節でき、その複合シートにおいて初期の引張張力が小さく、まろやかな加重伸張曲線になるメリットもある。

【0090】本発明においてゴムストランドを使用する利点は、ゴム弾性特性や伸度、耐久性などが合目的に製造された既成のゴムストランドを効率的に使用できる点にある。すなわち、ゴム弾性体のネットや不織布、フィルムなどを使用する場合と比較して、弾性体同士の交点部分が太くなる形態的な欠点を有さず、また、成形が困難な天然ゴムラテックスから成形されたストランドなども使用できるなど、材料面の選択の幅が広いからである。また、それらのことより、目的の加重伸張曲線、ヒステリシスカーブなどを最小のゴム量で実現できる。使用するゴム量が少ないことは、単に経済性の面ばかりでなく、薄くて軽い製品が望まれている昨今の製品では、そのような製品特性の面からも重要である。

【0091】本発明の製造方法では、ゴムストランドを支持部材上に巻き付けていく手段が用いられる。ゴム弾性を有していない通常の糸を支持部材に巻き付けていく手段の代表的なものは、フランスのシャバノ社によって開発された技術（フランス追加特許79765号）があり、その改良発明も種々なされている（フランス特許1208968号、特公昭47-14791号公報、特公昭51-2543号公報、特開昭51-78879号公報など）。これらは、通常の糸を、回転する糸案内装置に導き、間隔をおいて配置された一対の、細長く回転可能な糸支持部材に糸を巻き付けることにより、糸の横配列体を製造する手段の例である。

【0092】また、ゴムストランドとは異なる別の糸を支持部材に巻き付けていく他の例として、糸支持部材であるシート状ベルトまたは一対のロープ状ベルトを走行させ、その支持部材に糸を巻き付けていく方式がある。ゴム弾性を有していない通常の糸の場合の代表的な例と

して、米国特許明細書3041230号、特公昭47-49796号公報に記載されたものなどがある。

【0093】また、ゴムストランドとは異なる別の糸を支持部材に巻き付けていく例としては、ゴム弾性を有していない通常の糸を円筒状の支持部材に巻き付けていく代表的な例が、米国特許明細書2797728号や、実公昭40-35506号公報に記載されている。

【0094】本発明は、ゴムではない通常の糸で確立しているネットの製造方法を利用することにより、横伸縮性複合シートを製造する際に使用する弾性体を有効に利用し、簡便な製造プロセスで横伸縮性複合シートを高速に製造することを可能にするものである。すなわち、本発明は、上記の通常の糸の横配列手段を、200%以上の伸縮性を有するゴムストランドに適用し、さらにそのゴムストランドを、横方向に100%以上の伸度を有する不織布に接合することにより、横伸縮性複合シートを製造できるようにした点に特徴がある。

【0095】

【実施例】（実施例1）図2に示した製造装置を使用して横伸縮性複合シートを作製した。不織布11としては、坪量（単位面積当たりの質量）50g/m²のポリプロピレン製スパンボンド不織布を縦方向に2.5倍延伸して得られた坪量20g/m²の縦配列不織布を用いた。幅1200mmの不織布11を、テフロン（登録商標）で離型処理された直径320mmの円筒状支持部材13に巻き付けていく。そして、円筒状支持部材13上で不織布11を走行させ、加硫された天然ゴムストランド（トータル繊維度250tex）に天然ゴムラテックスを噴霧した後、そのゴムストランドを、走行する不織布11上に2.5mmピッチの間隔で巻き付けていく。

【0096】このようにして不織布11上にゴムストランドを積層・接合することにより横伸縮性複合シートを製造した。得られた横伸縮性複合シートの坪量は172g/m²であり、シートの横方向に200%の伸縮を20回繰り返したところ、残留歪みは7%であった。

【0097】（実施例2）図3に示した製造装置を使用して横伸縮性複合シートを作製した。SEBS（スチレン-エチレンブチレン-スチレン）系樹脂（シェルジャパン社製クレイトンG1857）のストランド（トータル繊維度180tex）を5mmピッチの間隔で一対の糸支持部材31巻き付け、横配列体34を形成した。

【0098】その後、収縮加工により横方向に100%以上の伸度を有する綿のカードウェブを横配列体34に接合し、坪量145g/m²の横伸縮性複合シートを製造した。シートの横方向に200%の伸縮を10回繰り返しても残留歪みが15%の伸縮性を有する横伸縮性複合シートが得られた。

【0099】

【発明の効果】以上説明したように本発明の横伸縮性複合シートの製造方法によれば、円筒状支持部材の外周面

に沿って円筒形状に付形された不織布上にゴムストランドを積層したり、あるいは、横方向に間隔を置いて配置された一対の糸支持部材にゴムストランドを巻き付けて横配列体を形成してから横配列体を不織布に接合することにより、ゴムストランドの材料が最小の量でも最も効率良く伸縮性を発揮できる横伸縮性複合シートを簡便かつ高速な方法で製造でき、横伸縮性複合シートを低コストで量産することが可能となる。すなわち、ゴムストランドの材料として使用する弾性体を有効に利用することができ、簡便な製造プロセスで横伸縮性複合シートを高速に製造することが可能になるという効果がある。また、不織布上でストランドを斜交させることにより、初期の引張張力が小さく、まろやかな加重伸張曲線になるという利点を有した横伸縮性複合シートの製造が可能となる。

【0100】本発明の製造方法により得られた横伸縮性複合シートは、伸縮性包帯、サポータ、衣類の袖口、伸縮テープ、ストレッチベルト、ブラジャーの肩紐、腹巻、妊婦帯、手袋や靴下のほずれ止め、オムツや失禁パッドなどの衛生材料の伸縮弾性部などの衣料、医療などに好適に使用される。

【図面の簡単な説明】

【図1】本発明の製造方法により作製された横伸縮性複合シートを示す平面図である。

【図2】本発明の横伸縮性複合シートの製造方法が適用された装置を示す斜視図である。

【図3】本発明の横伸縮性複合シートの製造方法が適用された装置の他の例を示す斜視図である。

【図4】本発明の横伸縮性複合シートの製造方法が適用された装置のさらに他の例を示す斜視図である。

【図5】図4に示される製造装置の上面図である。

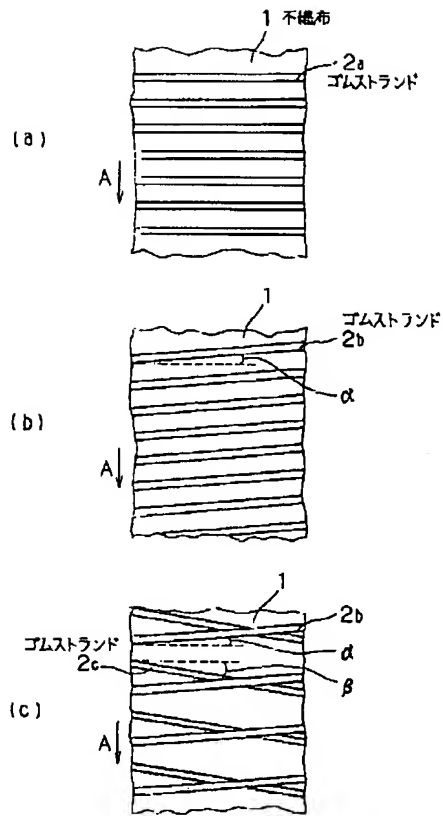
【図6】図4および図5に示される糸支持部材を拡大して示した側面図である。

【符号の説明】

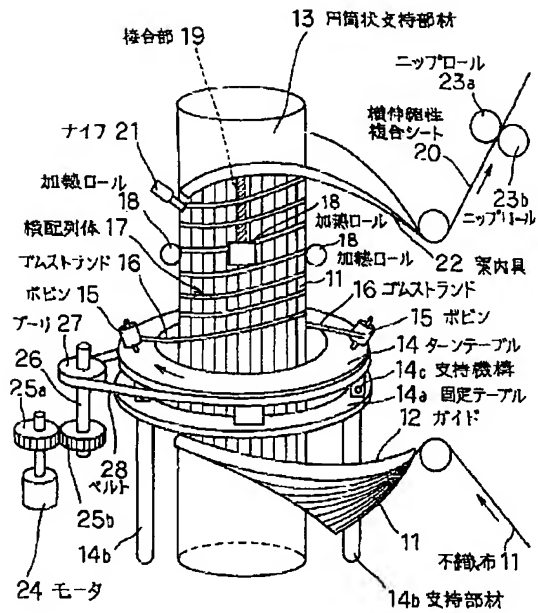
1、11、11a、11b、11c、11d、11e
不織布
2a、2b、2c、16、16a、16b ゴムストランド
12 ガイド
13 円筒状支持部材
14 ターンテーブル
14a 固定テーブル
14b 支持部材
14c 支持機構
15 ボビン
17、34、73 横配列体
18 加熱ロール
19 接合部
20、37、77 横伸縮性複合シート

21 ナイフ
22 案内具
23a、23b ニップロール
24、46a、46b、83 モータ
25a、25b、45a、45b、45c ギア
26 シャフト
27 プーリ
28 ベルト
31、71 糸支持部材
32 リング
32a 内歯
33 ボビン
33a シャフト
35a、35b、78a、78b 加熱シリンダ
36a、36b 離型シート
38 巻取ロール
41a～41c シャフト
42a～42c ベルト車
43a～43f、44a、44b、50、80、81a、81b、81c、81d ロール
47 回転ナイフ
48 テーブル
48a 溝
48b 調節ボルト
48c シャフト
49 ローラ
51 除去部
52 スプレーノズル
53 案内部材
72 糸案内装置
72a 中空軸
72b 垂直部分
72c 平行部分
72d 先端部
74a、74b スクリュー溝
75、75a ボビン
76a、76b、79a、79b ニップロール
81 巻取ロール
82 フレーム
84a、84b、84c、84d スプロケット
85a、85b 回転軸
86a、86b 歯車
87 案内板
87a 穴
89a、89b チェーン
90 糸
91 軸受け
92 錘
93 取付棒

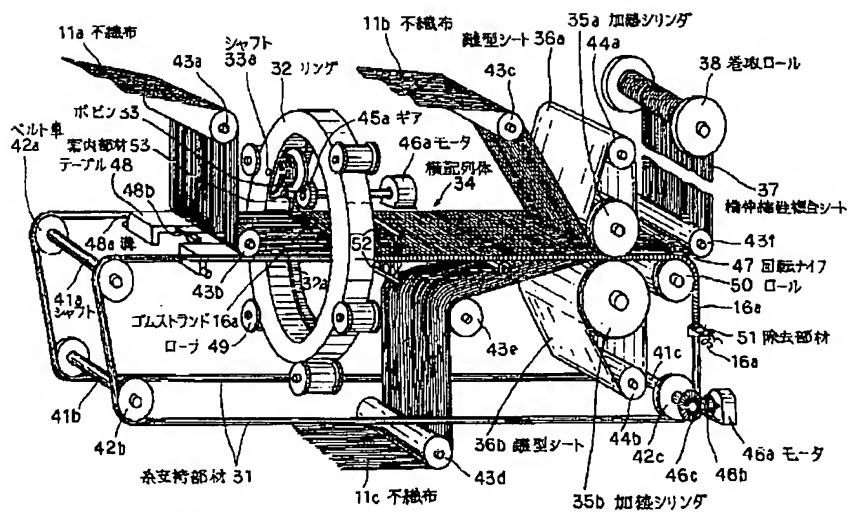
【図1】



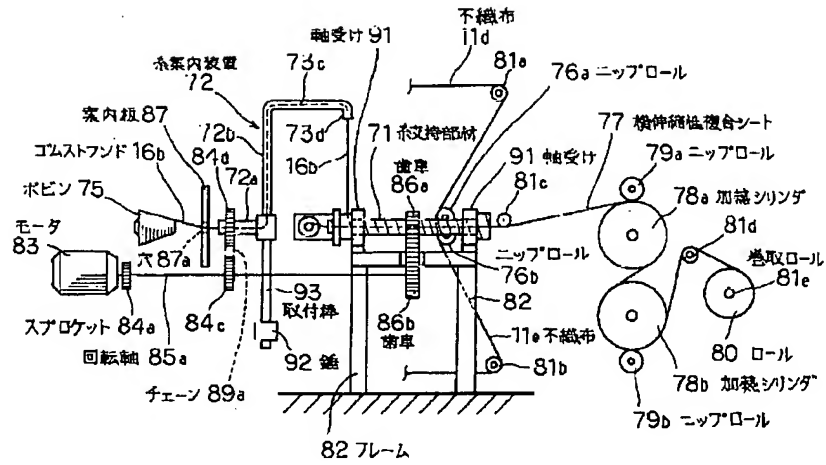
【図2】



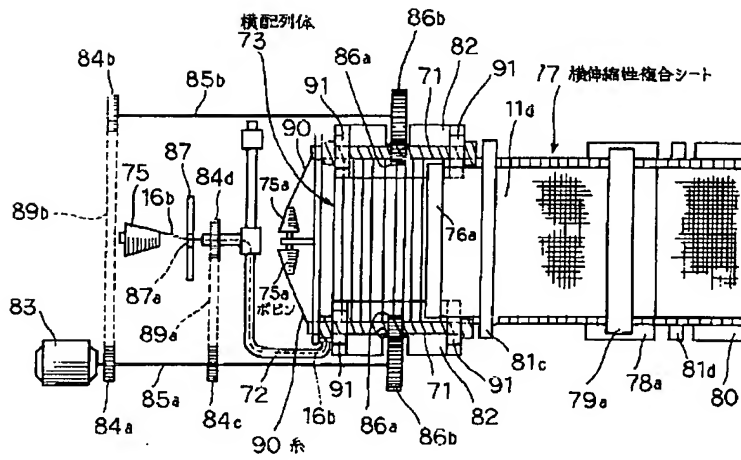
【図3】



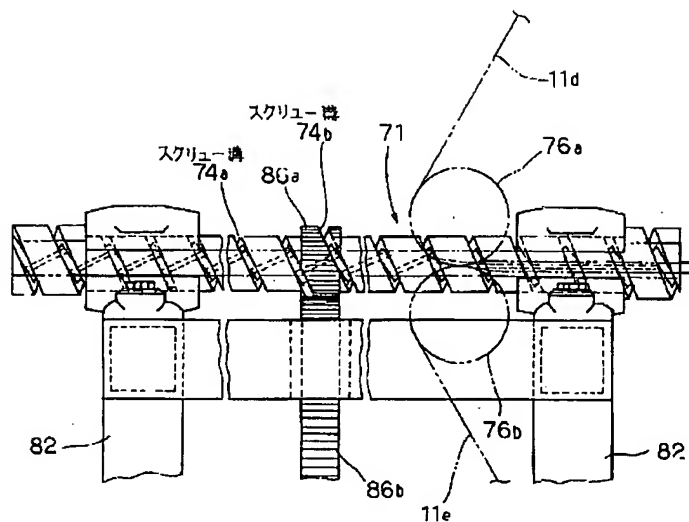
【図4】



【図5】



【図6】



フロントページの続き

(72)発明者 石田 大
千葉県成田市東和田584-1

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CLAIMS

[Claim(s)]

[Claim 1] It is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. Said nonwoven fabric a ** form in the shape of a cylindrical shape The cylindrical supporter material for supporting by carrying out, The process which prepares the yarn guide apparatus which guides a rubber strand on the nonwoven fabric which rotated the outside of said cylindrical supporter material by having made the medial axis of this cylindrical supporter material into the center of rotation, and was supported by said cylindrical supporter material, The process which leads the nonwoven fabric which has 100% or more of ductility in a longitudinal direction to the peripheral face of said cylindrical supporter material, and carries out the ** form of said nonwoven fabric to the shape of a cylindrical shape continuously along with the peripheral face of said cylindrical supporter material, While making it run said nonwoven fabric by which the ** form was carried out to the shape of a cylindrical shape in the direction parallel to the axis of said cylindrical supporter material By rotating said yarn guide apparatus, showing the rubber strand which has 200% or more of elasticity to said nonwoven fabric on said cylindrical supporter material with said yarn guide apparatus The process which twists said rubber strand on said nonwoven fabric it runs by the shape of a cylindrical shape, The process which joins the rubber strand twisted on it to said nonwoven fabric it runs, The manufacture approach of a horizontal elasticity compound sheet of having the process which develops continuously in a flat-surface configuration and takes out said nonwoven fabric from the shape of a cylindrical shape in it, pulling apart the nonwoven fabric to which said strand was joined from said cylindrical supporter material.

[Claim 2] It is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. The yarn supporter material of the pair supports said strand in case the laminating of said rubber strand is carried out on said nonwoven fabric, and holds the condition of having kept spacing of abbreviation regularity in the longitudinal direction, and it runs in the same direction mutually, The process which prepares the yarn guide apparatus to which it shows this rubber strand so that the perimeter of the yarn supporter material of this pair may be rotated and a rubber strand may be twisted around the yarn supporter material of said pair, With said yarn guide apparatus turning around those perimeters, running a lengthwise direction the yarn supporter material of said pair By twisting around the yarn supporter material of said pair the rubber strand which has 200% or more of elasticity The manufacture approach of a horizontal elasticity compound sheet of having the process which forms the horizontal array object with which it comes to arrange said rubber strand in a longitudinal direction mostly between the yarn supporter material of said pair, and the process which joins said horizontal array object to the nonwoven fabric which has 100% or more

of ductility in a longitudinal direction, and produces a horizontal elasticity compound sheet.

[Claim 3] It is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. While keeping spacing in a longitudinal direction and being arranged so that said rubber strand may be supported in case the laminating of said rubber strand is carried out on said nonwoven fabric The supporter material of the pair which each rotates in order to move the rubber strand which each has the engagement section which engages with this rubber strand in order to move the rubber strand to support to a lengthwise direction, and engaged with this engagement section to a lengthwise direction, The process which prepares the yarn guide apparatus to which it shows a rubber strand so that it may rotate around the supporter material of this pair, a rubber strand may be made to engage with the engagement section of each the material of said supporter and a rubber strand may be twisted around the supporter material of said pair, Twisting around the supporter material of said pair the rubber strand which has 200% or more of elasticity with said rotating yarn guide apparatus, and making this rubber strand engage with said engagement section By making it move to each rotation actuation of said supporter material with the rubber strand which engaged with said engagement section The process which forms the horizontal array object with which it comes to arrange said rubber strand in a longitudinal direction between the supporter material of said pair mostly, The manufacture approach of a horizontal elasticity compound sheet of having the process which joins said horizontal array object which moves when the supporter material of said pair rotates to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction, and produces a horizontal elasticity compound sheet.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of a horizontal elasticity compound sheet of coming to allot a rubber strand in a longitudinal direction on a nonwoven fabric. Especially this invention produces the horizontal array object of a strand with a simple means to twist a rubber strand around supporter material, and relates to the manufacture approach of the horizontal elasticity compound sheet by joining the strand on the nonwoven fabric which has at least 100% or more of ductility in a longitudinal direction. Especially the horizontal elasticity compound sheet manufactured by the process is used for garments, such as the flexible elastic sections, such as elasticity dressings, a supporter, a cuff of clothing, and a diaper, medicine, hygienic goods, etc.

[0002]

[Description of the Prior Art] Various techniques are proposed from the former as the nonwoven fabric and the elastic body are indicated by JP,3-213543,A, JP,8-174764,A, etc. about the elasticity compound sheet which comes to carry out a laminating. By the manufacture approach of the elastic body indicated by JP,3-213543,A, thin band-like elastic bodies, such as a rubber thread and Taira rubber, are first supplied in the state of expanding between a nonwoven fabric on top and a nonwoven fabric at the bottom at a longitudinal direction. And a nonwoven fabric on top and a nonwoven fabric at the bottom are partially pasted up using the adhesive property of a nonwoven fabric, and a large number formation of the part for a part for jointing and a non-adhesion part is carried out about a nonwoven fabric on top, respectively. Thereby, the elastic body with which it comes to unite the elastic body of an expanding condition with the nonwoven fabric of a top face and an inferior surface of tongue is produced.

[0003] The complex with which the flexible direction was regulated is indicated by JP,8-174764,A. As for the complex, it comes to carry out the laminating of the elasticity elastomer layer to an extension continuous glass fiber web. An extension continuous glass fiber web extends the continuous glass fiber web formed by carrying out spinning of the thermoplastics to an one direction, and makes the fiber of the web arrange in the about 1 direction. Thus, by having constituted the complex with which the flexible direction was regulated, aesthetic property is good and the elasticity compound sheet which has moderate elasticity is obtained.

[0004]

[Problem(s) to be Solved by the Invention] However, by development of charges of garments material, such as a diaper, though it is quality, the manufacture approach which can produce an

elasticity compound sheet for high productivity cheaply has been searched for at recent years. For that purpose, using the elastomer to be used effectively or that a manufacture process is simple, and manufacturing an elasticity compound sheet at a high speed have been called for. [0005] In case the purpose of this invention manufactures the horizontal elasticity compound sheet which has elasticity in a longitudinal direction, it can use the elastic body to be used effectively and is to offer the manufacture approach of a horizontal elasticity compound sheet which can manufacture a horizontal elasticity compound sheet at a high speed in a simple manufacture process.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. Said nonwoven fabric a ** form in the shape of a cylindrical shape The cylindrical supporter material for supporting by carrying out, The process which prepares the yarn guide apparatus which guides a rubber strand on the nonwoven fabric which rotated the outside of said cylindrical supporter material by having made the medial axis of this cylindrical supporter material into the center of rotation, and was supported by said cylindrical supporter material, The process which leads the nonwoven fabric which has 100% or more of ductility in a longitudinal direction to the peripheral face of said cylindrical supporter material, and carries out the ** form of said nonwoven fabric to the shape of a cylindrical shape continuously along with the peripheral face of said cylindrical supporter material, While making it run said nonwoven fabric by which the ** form was carried out to the shape of a cylindrical shape in the direction parallel to the axis of said cylindrical supporter material By rotating said yarn guide apparatus, showing the rubber strand which has 200% or more of elasticity to said nonwoven fabric on said cylindrical supporter material with said yarn guide apparatus The process which twists said rubber strand on said nonwoven fabric it runs by the shape of a cylindrical shape, It has the process which joins the rubber strand twisted on it to said nonwoven fabric it runs, and the process which develops continuously in a flat-surface configuration and takes out said nonwoven fabric from the shape of a cylindrical shape in it, pulling apart the nonwoven fabric to which said strand was joined from said cylindrical supporter material.

[0007] In the above-mentioned invention, the nonwoven fabric which has 100% or more of ductility is first led to a longitudinal direction at cylindrical supporter material, the ** form of the nonwoven fabric is carried out to the shape of a cylindrical shape along with the peripheral face of cylindrical supporter material, and it supports by cylindrical supporter material. The perimeter of cylindrical supporter material is made to rotate a yarn guide apparatus, while making it run a cylindrical shape-like nonwoven fabric in the direction parallel to the axis of cylindrical supporter material, showing the rubber strand which has 200% or more of ductility to the nonwoven fabric on cylindrical supporter material with a yarn guide apparatus. A horizontal elasticity compound sheet is produced by twisting a rubber strand on a cylindrical shape-like nonwoven fabric by this, next joining the rubber strand to a nonwoven fabric. Next, a flat horizontal elasticity compound sheet is obtained by developing continuously in a flat-surface configuration and taking out from the shape of a cylindrical shape in it, pulling apart the nonwoven fabric to which the rubber strand was joined from cylindrical supporter material. Since the ingredient of a rubber strand can manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently also in the minimum amount by the simple and

high-speed approach according to such an approach, it becomes possible to mass-produce a horizontal elasticity compound sheet by low cost. Moreover, when the horizontal elasticity compound sheet with which rubber strands crossed diagonally on the nonwoven fabric by using two or more yarn guide apparatus is produced, with the sheet, there is also a merit that early **** tension is small and becomes a mellow load elongation curve.

[0008] Moreover, this invention is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. The yarn supporter material of the pair supports said strand in case the laminating of said rubber strand is carried out on said nonwoven fabric, and holds the condition of having kept spacing of abbreviation regularity in the longitudinal direction, and it runs in the same direction mutually, The process which prepares the yarn guide apparatus to which it shows this rubber strand so that the perimeter of the yarn supporter material of this pair may be rotated and a rubber strand may be twisted around the yarn supporter material of said pair, With said yarn guide apparatus turning around those perimeters, running a lengthwise direction the yarn supporter material of said pair By twisting around the yarn supporter material of said pair the rubber strand which has 200% or more of elasticity It has the process which forms the horizontal array object with which it comes to arrange said rubber strand in a longitudinal direction mostly between the yarn supporter material of said pair, and the process which joins said horizontal array object to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction, and produces a horizontal elasticity compound sheet.

[0009] In the above-mentioned invention, the rubber strand which has 200% or more of elasticity is twisted around the yarn supporter material of a pair, making the perimeter of those yarn supporter material rotate a yarn guide apparatus, while holding the condition of having kept almost fixed spacing for the yarn supporter material of a pair in the longitudinal direction and running a lengthwise direction. Thereby, the horizontal array object with which it comes to arrange a rubber strand in a longitudinal direction mostly is formed between the yarn supporter material of a pair. Next, a horizontal elasticity compound sheet is produced by joining the horizontal array object to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction. It enables it for the ingredient of a rubber strand to be able to manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently by the simple and high-speed approach, and to mass-produce a horizontal elasticity compound sheet also in the minimum amount like the approach using cylindrical supporter material, as mentioned above, also by such approach, at low cost.

[0010] Furthermore, this invention is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. While keeping spacing in a longitudinal direction and being arranged so that said rubber strand may be supported in case the laminating of said rubber strand is carried out on said nonwoven fabric The supporter material of the pair which each rotates in order to move the rubber strand which each has the engagement section which engages with this rubber strand in order to move the rubber strand to support to a lengthwise direction, and engaged with this engagement section to a lengthwise direction, The process which prepares the yarn guide apparatus to which it shows a rubber strand so that it may rotate around the supporter material of this pair, a rubber strand may be made to engage with the engagement section of each the material of said supporter and a rubber strand may be twisted around the supporter material of said pair, Twisting around the supporter material of said pair the rubber strand which has 200% or more of elasticity with said

rotating yarn guide apparatus, and making this rubber strand engage with said engagement section By making it move to each rotation actuation of said supporter material with the rubber strand which engaged with said engagement section The process which forms the horizontal array object with which it comes to arrange said rubber strand in a longitudinal direction between the supporter material of said pair mostly, It has the process which joins said horizontal array object which moves when the supporter material of said pair rotates to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction, and produces a horizontal elasticity compound sheet.

[0011] In the above-mentioned invention, a horizontal elasticity compound sheet is produced using the yarn supporter material of the pair which rotates in order to move a rubber strand to a lengthwise direction. Yarn supporter material has the engagement section which engages with a rubber strand, and the rubber strand which engaged with the engagement section is moved to an one direction with rotation actuation of yarn supporter material. First, in a longitudinal direction, spacing is kept, the yarn supporter material of a pair is arranged, the rubber strand which has 200% or more of elasticity is guided, it twists around the yarn supporter material of a pair, and the rubber strand is made to engage with the engagement section of yarn supporter material with the yarn guide apparatus turning around those perimeters. The rubber strand which engaged with the engagement section is moved to a lengthwise direction by rotation actuation of yarn supporter material, twisting a rubber strand around the yarn supporter material of a pair such. A horizontal elasticity compound sheet is manufactured by joining the horizontal array object which the horizontal array object with which it comes to arrange a rubber strand in a longitudinal direction mostly was formed between the yarn supporter material of a pair by this, next was formed to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction. It enables it for the ingredient of a rubber strand to be able to manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently by the simple and high-speed approach, and to mass-produce a horizontal elasticity compound sheet also in the minimum amount, also by such approach, at low cost.

[0012] With the "lengthwise direction" used in this invention when explaining the production process of a horizontal elasticity compound sheet, the array direction of the fiber of a nonwoven fabric, etc. Those feed directions at the time of manufacturing a horizontal elasticity compound sheet and a nonwoven fabric are meant. The "longitudinal direction" used when explaining the array direction of a rubber strand, the ductility of a nonwoven fabric, the flexible direction of a horizontal elasticity compound sheet, etc. means a lengthwise direction and a right-angled direction, i.e., the cross direction of a nonwoven fabric or a horizontal elasticity compound sheet.

[0013] The "ductility" in this invention applies to JIS-L1095. That is, in the die-length direction, width of face opens spacing of 10cm, grasps the web which is 5cm, it pulls by speed-of-testing 30 cm/min, and the elongation over the original die length when a web fractures is expressed with %.

[0014] With the "strand" in this invention, a flexible material others, endless [comparatively thick], or semi- endless is also usually included. [flexible material / endless / which is called a filament / comparatively thin / or semi- endless] Although it is about hundreds of tex even when calling it a filament, and the fineness is large, as for the "strand" in this invention, that whose fineness is thousands of tex is also contained. In addition, a "strand" may be called total fineness in order to distinguish from the fineness of each strand which each thin strands may gather, may constitute a thick strand, and constitutes the fineness of the thick strand in that case.

[0015] After giving fixed elongation, applying tension to a strand, the "elasticity of a strand" in this invention will mean the property which the elongation recovers near the original die length in rubber elasticity, if the tension is canceled. at least 50% of the ductility given to the strand although a strand did not need to return to the original die length completely as a rate recovered elastically -- desirable -- 80% (20% of residual ductility) -- more -- desirable -- 90% or more (10% or less of residual ductility) recovery -- carrying out -- ****ing .

[0016]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained with reference to a drawing.

[0017] Drawing 1 is the top view showing the horizontal elasticity compound sheet produced by the manufacture approach of this invention.

[0018] Rubber strand 2a arranged by the right-angled longitudinal direction to the lengthwise direction (the die-length direction) on the nonwoven fabric 1 prolonged in the lengthwise direction where the horizontal elasticity compound sheet shown in drawing 1 (a) is shown by the arrow head A is a laminating and the thing which it comes to join. It comes to arrange a fiber in the die-length direction (lengthwise direction), and the nonwoven fabric 1 has 100% or more of ductility in the longitudinal direction (cross direction). Rubber strand 2a has 200% or more of elasticity in the die-length direction. In this case, strand 2a is almost parallel to the longitudinal direction of a nonwoven fabric 1, and the include angle accomplished in a straight line parallel to a longitudinal direction serves as zero mostly.

[0019] The horizontal elasticity compound sheet shown in drawing 1 (b) is a thing when rubber strand 2b by which the laminating was carried out carries out a skew for some and is arranged to a longitudinal direction on a nonwoven fabric 1, and drawing 1 (b) has shown extent of the skew of rubber strand 2b at an angle of [α] the smaller one among the include angles with a straight line parallel to a longitudinal direction to make. In this invention, it is desirable still more desirable for an include angle α to be smaller than 45 degrees, and 10 or less degrees is the most desirable 30 or less degrees.

[0020] rubber strand 2c which crosss diagonally with rubber strand 2b in the horizontal elasticity compound sheet which showed the horizontal elasticity compound sheet shown in drawing 1 (c) to drawing 1 (b) -- a nonwoven fabric 1 top -- further -- a laminating -- and it is joined and constituted. To the longitudinal direction, rubber strand 2c carries out the skew of some, and is arranged, and extent of the skew is shown at an angle of [β] the smaller one by drawing 1 (c) by the case where it is shown in drawing 1 (c) among the include angles with a straight line parallel to a longitudinal direction to make. The skew of the rubber strand 2c does not necessarily have to be carried out to the longitudinal direction, and it may be almost parallel to a longitudinal direction. Although rubber strand 2b and each skew include angle α and β of 2c do not need to be equal, it is desirable for each skew include angle to be 45 or less degrees.

[0021] Each horizontal elasticity compound sheet shown in drawing 1 (a) - drawing 1 (c) has big elasticity in the longitudinal direction, and is used for it suitable for garments, such as the flexible elastic section of hygienic goods, such as the strap of elasticity dressings, a supporter, the cuff of clothing, a flexible tape, a stretch belt, and a brassiere, a stomach band, a grvida band, a ***** stop of a glove or socks, a diaper, and an incontinentia pad, medicine, etc.

[0022] Drawing 2 is the perspective view showing the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[0023] In the manufacturing installation of the horizontal elasticity compound sheet of this

operation gestalt, the ring-like turntable 14 is attached in the top face of fixed-angular-table 14a of the shape of a ring fixed by supporter material 14b as shown in drawing 2 through support device 14c. Each medial axis of fixed-angular-table 14a and a turntable 14 is both arranged on the same straight line parallel to the direction of a vertical. It is supported by support device 14c so that a turntable 14 may become pivotable on fixed-angular-table 14a by making the medial axis into the center of rotation. The bobbin 15 around which the rubber strand 16 is wound is attached to the top face of a turntable 14 a large number pivotable. Although only two bobbins 15 are shown by drawing 2 since it is simple, many bobbins 15 are arranged along with the circumferential direction of a turntable 14 on the top face of a turntable 15. A yarn guide apparatus consists of a bobbin 15 of these large number, a turntable 14, etc., and the rubber strand 16 is guided by the equipment to the lateral surface of the nonwoven fabric 11 on the cylindrical supporter material 13. The rubber strand 16 has 200% or more of elasticity in the die-length direction.

[0024] The slot where a belt 28 is inserted in the peripheral face of a turntable 14 is formed. The belt 28 is hung on the slot formed in the peripheral face of a turntable 14, and the pulley 27 attached in the end section of a shaft 26. Gear 25a was attached in the other end of a shaft 26, and gear 25b has geared with gear 25b attached in the revolving shaft of a motor 24. The power of a motor 24 is told to a turntable 14 through Gears 25a and 25b, a shaft 26, a pulley 27, and a belt 28 with drive actuation of a motor 24, and a turntable 14 is rotated.

[0025] Moreover, the manufacturing installation of this operation gestalt is equipped with the cylindrical supporter material 13 which passes along the inside of fixed-angular-table 14a and a turntable 14. The cylindrical supporter material 13 is being fixed so that the medial axis may be arranged on fixed-angular-table 14a and the same straight line as the medial axis of a turntable 14. Near the part below fixed-angular-table 14a of the cylindrical supporter material 13, the guide 12 to which it shows the band-like nonwoven fabric 11 sent into the cylindrical supporter material 13 is formed. The guide 12 has the curve side which leads a nonwoven fabric 11 to the peripheral face of the cylindrical supporter material 13 so that foaming of the nonwoven fabric 11 of a flat-surface configuration may be carried out to the shape of a cylindrical shape along with the peripheral face of the cylindrical supporter material 13. The cylindrical supporter material 13 is for supporting a nonwoven fabric 11 in the state of the shape of a cylindrical shape by touching the medial surface of the nonwoven fabric 11 by which the ** form was carried out to the shape of a cylindrical shape. It comes to arrange a fiber in a lengthwise direction, and the nonwoven fabric 11 has 100% or more of ductility in a longitudinal direction, i.e., the cross direction.

[0026] Above the turntable 14 of the cylindrical supporter material 13, many heating rollers 18 for joining the rubber strand 16 from a bobbin 15 are formed on the nonwoven fabric 11 which is in contact with the peripheral face of the cylindrical supporter material 13. Two or more heating rollers 18 are put in order along with the circumferential direction of the cylindrical supporter material 13, and each heating roller 18 is supported pivotable, after the medial axis has become a right angle to the direction of a vertical. A nonwoven fabric 11 and the rubber strand 16 are put between each heating roller 18 and the cylindrical supporter material 13, and the rubber strand 16 is joined on a nonwoven fabric 11 by heating them by the heating roller 18.

[0027] Furthermore, above the heating roller 18 of the cylindrical supporter material 13, the knife 21 as a cutting means to cut the rubber strand 16 near the crosswise edge of a nonwoven fabric 11, and the guidance implement 22 guided so that a nonwoven fabric 11 may be developed

in a flat-surface configuration from the shape of a cylindrical shape after a knife 21 cuts the rubber strand 16 are formed. The nip rolls 23a and 23b of the pair which takes over the nonwoven fabric 11 led to the guidance implement 22 by the guidance implement 22 in near are arranged. These nip rolls 23a and 23b are the conveyance means for conveying a nonwoven fabric 11 within a manufacturing installation, and a nonwoven fabric 11 is supplied to a guide 12 by taking over actuation of the nonwoven fabric 11 with these rolls by the upstream of a conveyance path. On the cylindrical supporter material 13, the nonwoven fabric 11 by which the ** form was carried out to the shape of a cylindrical shape along with the peripheral face is run by the direction parallel to the direction of an axis of the shape of the cylindrical shape, i.e., a lengthwise direction, along with the peripheral face of the cylindrical supporter material 13.

[0028] Next, the actuation of a manufacturing installation shown in drawing 2 is explained.

[0029] First, the nonwoven fabric 11 sent into the guide 12 is continuously twisted around the peripheral face of the cylindrical supporter material 13 with a guide 12. Thereby, along with the peripheral face of the cylindrical supporter material 13, the ** form of the nonwoven fabric 11 is carried out to the shape of a cylindrical shape, and where the shape of the cylindrical shape is held, a nonwoven fabric 11 moves the cylindrical supporter material 13 top to a lengthwise direction toward the upper part. Around [some] the nonwoven fabric 11 which moves in the cylindrical supporter material 13 top, the turntable 14 is rotating by the motor 24. According to rotation of this turntable 14, from the bobbin 15, the rubber strand 16 is solved and the rubber strand 16 which was able to be solved coils around the nonwoven fabric 11 on the cylindrical supporter material 13. Thereby, the horizontal array object 17 with which it comes to arrange the rubber strand 16 in a longitudinal direction mostly is formed on the nonwoven fabric 11 on the cylindrical supporter material 13, i.e., the member.

[0030] When the quality of the material of the rubber strand 16 is thermoplastic elastomer, the joint 19 of a nonwoven fabric 11 and the rubber strand 16 is partially formed by the heating roller 18 which puts a nonwoven fabric 11 and the rubber strand 16 between the cylindrical supporter material 13, and is rotating. Although the heating roller 18 is not illustrated by drawing 2, it is desirable for the rotation drive to be carried out by the driving means of a motor etc.

[0031] After the rubber strand 16 is separated with a knife 21 near the crosswise both ends of a nonwoven fabric 11, the horizontal elasticity compound sheet 20 to which it comes to join a nonwoven fabric 11 and the rubber strand 16 by many heating rollers 18 partially is pulled apart from the cylindrical supporter material 13, and it is continuously developed by the flat from the shape of a cylindrical shape with the guidance implement 22 to a flat-surface configuration, and it is returned. Thus, the horizontal elasticity compound sheet 20 taken out from the cylindrical supporter material 13 is taken over by nip rolls 23a and 23b.

[0032] After the horizontal elasticity compound sheet 20 with which the rubber strand 16 was partially joined on the nonwoven fabric 11 is made into a flat, further, by the whole, it joins the rubber strand 16 to a nonwoven fabric 11, and unifies in many cases.

[0033] Although the turntable 14 showed one example by drawing 2, as shown in drawing 1 (c), rubber strands can produce the oblique intersection rubber array object which crossed diagonally mutually by forming two turntables 14 in a manufacturing installation, and making hard flow rotate two turntables 14 of each other. And the horizontal elasticity compound sheet of a configuration of having been shown in drawing 1 (c) is manufactured by carrying out the laminating of the skew rubber array object on a nonwoven fabric 11. In this manufacturing installation, by adjusting the feed rate of a nonwoven fabric 11, and the rotational speed of a

turntable 14, the rubber strand 16 by which a laminating is carried out on a nonwoven fabric 11 can be mostly made parallel with a longitudinal direction, or can carry out a skew to a longitudinal direction.

[0034] In addition, although drawing 2 showed equipment in case the quality of the material of the rubber strand 16 is thermoplastic elastomer, when the quality of the material of the rubber strand 16 is natural rubber which does not show thermoplasticity, and the rubber strand 16 lets out from a bobbin 15, the adhesives supply means to the rubber strand 16 is needed, such as carrying out the spray of the adhesives to the rubber strand 16, and applying them to it.

[0035] Drawing 3 is the perspective view showing other examples of the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[0036] At the manufacturing installation shown in drawing 3, the yarn supporter material 31 of the shape of a belt of the pair which kept spacing in the longitudinal direction and was mutually stretched in the parallel condition is circulated, and the horizontal array object 34 is produced by twisting rubber strand 16a around the yarn supporter material 31 of these pairs. And 37 is manufactured in a horizontal elasticity compound sheet by joining the horizontal array object 34 to a nonwoven fabric. In this manufacturing installation, one yarn supporter material 31 is stretched by belt pulley 42a attached in the end section of shaft 41a, belt pulley 42b attached in the end section of shaft 41b, belt pulley 42c attached in the end section of shaft 41c, and the end section of a roll 50 among the yarn supporter material 31 of a pair. The yarn supporter material 31 of another side is stretched by belt pulley 42a attached in the other end of shaft 41a, belt pulley 42b attached in the other end of shaft 41b, belt pulley 42c attached in the other end of shaft 41c, and the other end of a roll 50.

[0037] Gear 46c is attached in one belt pulley 42c, and gear 46b which gears with the gear 46c is attached in the revolving shaft of motor 46b. By carrying out the rotation drive of the motor 46b, the power of the motor 46b is told to shaft 41c and belt pulley 42c of the both ends of shaft 41c through Gears 46b and 46c. Thereby, belt pulley 42c of a shaft 41 and a pair rotates, and where almost fixed spacing is kept in a longitudinal direction between the yarn supporter material 31 of a pair, each yarn supporter material 31 is run by the lengthwise direction at the same rate.

[0038] The part between belt pulley 42a in the yarn supporter material 31 of a pair and a roll 50 passes along the inside of the ring 32 which constitutes the device for twisting rubber strand 16a around those yarn supporter material 31. The medial axis of a ring 32 is parallel to the transit direction of the yarn supporter material 31 which passes the inside. This ring 32 is supported pivotable considering the medial axis of a ring 32 as the center of rotation with two or more rollers 49 which touch that peripheral face. Internal-tooth 32a on a par with the circumferential direction is formed in the inner skin of a ring 32. In internal-tooth 32a, gear 45a attached in the shaft connected with the revolving shaft of motor 46a has geared. When the power of motor 46a is told to a ring 32 by gear 45a and internal-tooth 32a, a ring 32 rotates the perimeter of the one section each of the yarn supporter material 31 of a pair.

[0039] Moreover, many bobbins 33 located in the inside are attached in the ring 32. Each bobbin 33 is attached in the ring 32 by shaft 33a pivotable. Although only one bobbin 33 is shown by drawing 3 since it is simple, many bobbins 33 are arranged in on the inner skin of a ring 32 along with the circumferential direction. Rubber strand 16a is wound around each bobbin 33. Rubber strand 16a has 200% or more of elasticity in the die-length direction. Furthermore, the interior material 53 of a proposal in which the pinhole for guiding rubber strand 16a which begins to be

rolled from a bobbin 33 was formed is attached to the inner skin of a ring 32 two or more picking corresponding to each bobbin 33. The yarn guide apparatus turning around the perimeter of the yarn supporter material 31 of a pair consists of these rings 32, many bobbins 33, interior material 53 of a proposal, etc. By the yarn guide apparatus, rubber strand 16a is guided so that rubber strand 16a may be twisted around the yarn supporter material 31 of a pair in rubber strand 16a.

[0040] In the yarn supporter material 31 of a pair, the table 48 on which each yarn supporter material 31 is engaged so that it may prevent that spacing of the yarn supporter material 31 becomes narrow may be formed in the part around which the rubber strand 31 is twisted, and its near. Accommodation bolt 48b for adjusting the width of face is attached in the table 48. Moreover, slot 48a with which the yarn supporter material 31 engages possible [sliding] is formed in the both-sides side of table 48b. By adjusting the width of face of a table 48 by accommodation bolt 48b, the condition of having engaged with each yarn supporter material 31 fang-furrow 48a is held.

[0041] Roll 43b for supplying nonwoven fabric 11a to the space between the yarn supporter material 31 of a pair is arranged at the upstream rather than the ring 32 in the transit direction of the yarn supporter material 31. It comes to arrange a fiber in a lengthwise direction, and nonwoven fabric 11a has 100% or more of ductility in the longitudinal direction. Above roll 43b, roll 43a for sending out nonwoven fabric 11a towards the roll 43b is arranged. Moreover, by the downstream, mold release sheet 36b which mold release sheet 36a stretched by heating-cylinder 35a and roll 44a with the yarn supporter material 31 up side of a pair ran, and was stretched by heating-cylinder 35b and roll 44b with the yarn supporter material 31 down side of a pair is running rather than the ring 32 in the transit direction of the yarn supporter material 31. Each heating cylinder is arranged so that the mold release sheets 36a and 36b may be put among heating cylinders 35a and 35b. The slot into which the yarn supporter material 31 gets is formed in each both ends of heating cylinders 35a and 35b. Furthermore, above the yarn supporter material 31 of a pair, roll 43c for sending in nonwoven fabric 11b from the bottom among the mold release sheets 36a and 36b is arranged. Below heating-cylinder 35a, the rolls 43d and 43e for sending in nonwoven fabric 11c from the bottom among the mold release sheets 36a and 36b are arranged. It comes to arrange a fiber in a lengthwise direction, and nonwoven fabrics 11b and 11c also have 100% or more of ductility in the longitudinal direction.

[0042] The quality of the material of rubber strand 16a is thermoplastic elastomer, and in order to join rubber strand 16a to each of nonwoven fabrics 11a, 11b, and 11c, heating cylinders 35a and 35b and the mold release sheets 36a and 36b are formed. The mold release sheets 36a and 36b through which it circulates by Rolls 44a and 44b and heating cylinders 35a and 35b run by the yarn supporter material 31 and this **. Thereby, junction to nonwoven fabrics 11a-11c and rubber strand 16a is performed by the nip of heating cylinders 35a and 35b between mold release sheet 36a and 36b.

[0043] Above the roll 50, the shaft which equipped both ends with the rotation knife 47 which rotates with the roll is arranged. The rotation knife 47 of the pair with which the shaft was equipped is for cutting rubber strand 16a twisted around the yarn supporter material 31 near each yarn supporter material 31. Roll 43f is arranged near the shaft equipped with the rotation knife 47 of a pair, and the horizontal elasticity compound sheet 37 which seceded from the yarn supporter material 31 is sent out via roll 43f by cutting rubber strand 16a with the rotation knife 47 to the winding roll 38 so that it may mention later. The laminating of rubber strand 16a and the nonwoven fabrics 11b and 11c is carried out, and the horizontal elasticity compound sheet 37

is constituted by nonwoven fabric 11a so that it may mention later. The winding roll 38 is rotated by the non-illustrated rotation driving gear, and the horizontal elasticity compound sheet 37 is rolled round by the winding roll 38. The driving gear made to rotate the winding roll 38 is a conveyance means for conveying nonwoven fabrics 11a, 11b, and 11c along with a production line, and each of nonwoven fabrics 11a, 11b, and 11c is supplied to a production line by taking over actuation of the horizontal elasticity compound sheet 37 with the winding roll 38.

[0044] Next, actuation of the manufacturing installation constituted as mentioned above is explained.

[0045] First, nonwoven fabric 11a is supplied to the space between these yarn supporter material 31 with Rolls 43a and 43a, running a lengthwise direction the yarn supporter material 31 of a pair. Nonwoven fabric 11a and the yarn supporter material 31 of a pair pass the inside of the revolving uptake ring 32. In the case of the passage, the yarn supporter material 31 of a pair and nonwoven fabric 11a coil around rubber strand 16a from each bobbin 33 according to rotation of a ring 32. Thereby, the horizontal array object 34 with which it comes to arrange rubber strand 16a in a longitudinal direction between the yarn supporter material 31 of a pair is formed in each of a nonwoven fabric 11a top and the bottom.

[0046] Horizontal array pair 34 and nonwoven fabric 11a is put by heating cylinders 35a and 35b among the mold release sheets 36a and 36b (i.e., between heating cylinders 35a and 35b) with nonwoven fabric 11b supplied from the bottom, and nonwoven fabric 11c supplied from the bottom. Thereby, the horizontal array object 34 is joined to each of nonwoven fabrics 11a, 11b, and 11c by those heating cylinders, and the horizontal elasticity compound sheet 37 with which it comes to carry out the laminating of them is produced. With this elasticity compound sheet 37, it has a laminated structure by which nonwoven fabric 11b was joined to the top face of nonwoven fabric 11a through the horizontal array object 34, and nonwoven fabric 11c was joined to the inferior surface of tongue of nonwoven fabric 11a through the horizontal array object 34.

[0047] Then, rubber strand 16a is cut by the rotation knife 47 near the yarn supporter material 31 by the longitudinal direction both ends of the horizontal array object 34 being put between a roll 50 and the rotation knife 47. Thereby, the horizontal elasticity compound sheet 37 is separated from each of the yarn supporter material 31 of a pair, and the detached horizontal elasticity compound sheet 37 is rolled round by the winding roll 38 via roll 43f. Rubber [dissociating from the horizontal elasticity compound sheet 37, and having adhered to the yarn supporter material 31] strand 16a is removed from the yarn supporter material 31 by the removal member 51.

[0048] Although the yarn guide apparatus which consists of a ring 32 or a bobbin 33 showed one example by the manufacturing installation of drawing 3 , as shown in drawing 1 (c), rubber strands can produce the oblique intersection rubber array object which crossed diagonally mutually by forming the two yarn guide apparatus and making hard flow rotate those yarn guide apparatus of each other. And the horizontal elasticity compound sheet of a configuration of having been shown in drawing 1 (c) is manufactured by carrying out the laminating of the skew rubber array object to a nonwoven fabric. In this manufacturing installation, by adjusting the travel speed of the yarn supporter material 31, and the rotational speed of a ring 32, rubber strand 16a which it lets out from a bobbin 33 can be mostly made parallel with a longitudinal direction, or can carry out a skew to a longitudinal direction.

[0049] At the manufacturing installation shown in drawing 3 , nonwoven fabric 11a is supplied to a production line by the upstream of the part where rubber strand 16a is twisted around the yarn supporter material 31. In such a case, if the nonwoven fabric of two sheets is piled up and

supplied to the supply path of nonwoven fabric 11a, the horizontal elasticity compound sheet of two sheets will be manufactured by one production process. Moreover, when supplying nonwoven fabric 11a by the upstream of a ring 32 in a production line and not supplying nonwoven fabrics 11b and 11c to a production line, the horizontal elasticity compound sheet with which rubber strand 16a was joined to the both sides of nonwoven fabric 11a is manufactured.

[0050] Furthermore, only nonwoven fabric 11c may be supplied, without supplying only nonwoven fabric 11b to a production line, without supplying nonwoven fabrics 11a and 11c among nonwoven fabrics 11a-11c, or supplying nonwoven fabrics 11a and 11b. In this case, after rubber strand 16a is twisted around the yarn supporter material 31, the horizontal elasticity compound sheet with which rubber strand 16a was joined to one side of nonwoven fabrics 11b or 11c is manufactured. Moreover, if nonwoven fabrics 11b and 11c are supplied without supplying nonwoven fabric 11a, the horizontal elasticity compound sheet with which rubber strand 16a was inserted among the nonwoven fabrics 11b and 11c of two sheets will be manufactured.

[0051] Although drawing 3 showed the example through which each of the yarn supporter material 31 of a pair circulates, yarn supporter material does not necessarily need to circulate. For example, you may make it run the yarn together with a product using the yarn which has reinforcement as yarn supporter material. In that case, the yarn for support is removed in the phase where the last product was produced. Manufacture of such a method may suit more, when the nonwoven fabrics 11a, 11b, and 11c without dimensional stability are used for a lengthwise direction.

[0052] Moreover, although drawing 3 showed the example using the cable through which it circulates as yarn supporter material 31, it is not necessary to necessarily use a circulation cable, and the circulation belt of the shape of a sheet of one sheet may be used as yarn supporter material. In addition, although drawing 3 also showed the example of equipment in case the quality of the material of rubber strand 16a is thermoplastic elastomer, when the quality of the material of rubber strand 16a is natural rubber which does not show thermoplasticity, and rubber strand 16a lets out from a bobbin 33, the supply means of the adhesives to rubber strand 16a is needed, such as carrying out the spray of the adhesives to rubber strand 16a, and applying them to it.

[0053] Drawing 4 is the side elevation showing the example of further others of the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied. Drawing 5 is the plan of the manufacturing installation shown in drawing 4, and drawing 6 is the side elevation having expanded and shown the yarn supporter material shown in drawing 4 and drawing 5.

[0054] In the manufacturing installation shown in drawing 4 and drawing 5, the yarn supporter material 71 of the shape of long and slender tubing of a pair keeps spacing in a longitudinal direction, and is arranged in parallel mutually. Each yarn supporter material 71 is attached pivotable on the frame 82 by the bearing 91 of the pair attached in the both ends. Each yarn supporter material 71 is supported by these frames 82 and the bearing 91. These yarn supporter material 71 rotates in the same direction mutually according to the device mentioned later.

[0055] The yarn guide apparatus 72 for twisting rubber strand 16b around each edge of the yarn supporter material 71 of a pair is supported pivotable centering on the revolving shaft parallel to the yarn supporter material 71 by the support device in which it does not illustrate. This yarn guide apparatus 72 is rotated around the yarn supporter material 71 of a pair by the device

mentioned later. Rubber strand 16b has 200% or more of elasticity in the die-length direction. The yarn guide apparatus 72 consists of hollow shaft 72a, perpendicular partial 72b, parallel part 73c, and a piping member continuously prolonged in order of 73d of points. Hollow shaft 72a is arranged in the center of rotation of the yarn guide apparatus 72, and sprocket 84d is prepared in the peripheral face of hollow shaft 72a. Perpendicular partial 72b was prolonged in the almost perpendicular direction to hollow shaft 72a, and parallel part 72c is prolonged in the direction parallel to hollow shaft 72a. 73d of points is prolonged toward the center of rotation of the yarn guide apparatus 72 from parallel part 72c, and the perimeter of the yarn supporter material 71 of a pair is rotated.

[0056] In hollow shaft 72a of the yarn guide apparatus 72, the rubber strand 16b lets out from the bobbin 75 around which rubber strand 16b was wound. After rubber strand 16b supplied to hollow shaft 72a is guided in the inside of the yarn guide apparatus 72, it lets it out from 73d of points, and it is twisted around the yarn supporter material 71 of a pair by rotation of the yarn guide apparatus 72. Between hollow shaft 72a and a bobbin 72, the guide plate 87 with which hole 87a was formed is arranged, and rubber strand 16b from a bobbin 72 is sent in in hollow shaft 72a through hole 87a. It fishes in the connection of hollow shaft 72a and perpendicular partial 72b as the part except hollow shaft 72a of the yarn guide apparatus 72, and the spindle 92 is attached in it with the attachment rod 93 parallel to parallel part 72b for doubling.

[0057] As shown in drawing 6, screw slot 74a as the engagement section to which rubber strand 16b twisted around the member engages with each peripheral face of the yarn supporter material 71 of a pair is formed over the other end from the die-length direction end section of the yarn supporter material 71. screw slot 74a is for rotation actuation of the yarn supporter material 71 being alike, and moving it to the die-length direction of the yarn supporter material 71, i.e., a lengthwise direction, with rubber strand 16b inserted in the slot. Moreover, each yarn supporter material 71 is equipped with gearing 86a for rotating it, and screw slot 74b which lapped with a part of screw slot 74a is formed in the peripheral face of each gearing 86a. As shown in drawing 5, the horizontal array object 73 with which rubber strand 16b is arranged in a longitudinal direction, and becomes is formed with rotation actuation of each yarn supporter material 71 among them, and the horizontal array object 73 is made to convey in such yarn supporter material 71 of the pair of a configuration by the lengthwise direction. In case rubber strand 16b which has the yarn supporter material 71 top conveyed at this time passes the inside of a bearing 91, and gearing 86a, it is transported to a lengthwise direction by the configuration of the screw slots 74a and 74b, without contacting members other than yarn supporter material 71.

[0058] Between the yarn supporter material 71 of a pair, the nip rolls 76a and 76b of a pair which put the horizontal array object 73 and rotate are arranged. Moreover, on nip rolls 76a and 76b, roll 81a for supplying 11d of nonwoven fabrics from the bottom among those rolls is arranged, and roll 81b for supplying nonwoven fabric 11e from the bottom among those rolls is arranged at the nip rolla [76] and 76b bottom. With such a configuration, the horizontal array object 73 can be made to be able to put among nonwoven fabrics 11d and 11e with nip rolls 76a and 76b, the laminating of them can be carried out, and, thereby, the horizontal elasticity compound sheet 77 which consists of a horizontal array object 73 and nonwoven fabrics 11d and 11e is produced. It comes to arrange a fiber in a lengthwise direction, and each of nonwoven fabrics 11d and 11e has 100% or more of ductility in the longitudinal direction (cross direction).

[0059] Heating-cylinder 78a and nip roll 79a which put 77 are arranged at the migration direction downstream of the horizontal elasticity compound sheet 77 sent out from the yarn

supporter material 71 of a pair in roll 81c and the horizontal elasticity compound sheet sent out from the roll. Furthermore, heating-cylinder 78b and nip roll 79b which put the horizontal elasticity compound sheet 77, and winding roll 81e which rolls round the horizontal elasticity compound sheet 77 sent out from between them via roll 81d are arranged at the downstream. The motor (un-illustrating) as a rotation driving gear made to rotate it is connected to winding roll 81e. In case the horizontal elasticity compound sheet 77 is twisted around the peripheral face of heating-cylinder 78a so that nonwoven fabric 11e may contact the cylinder, in case the horizontal elasticity compound sheet 77 passes through a heating-cylinder 78a top, and it passes through a heating-cylinder 78b top, the horizontal elasticity compound sheet 77 is twisted around the peripheral face of heating-cylinder 78b so that 11d of nonwoven fabrics may contact the cylinder.

[0060] Moreover, this manufacturing installation is equipped with the motor 83 as a driving means for rotating the yarn guide apparatus 72 and each yarn supporter material 71. While revolving-shaft 85a for rotating one [the yarn guide apparatus 72 and] yarn supporter material 71 is connected to the revolving shaft of a motor 83, sprocket 84a for rotating the yarn supporter material 71 of another side through revolving-shaft 85b etc. is attached. Gearing 86b which gears with sprocket 84c for telling the power of a motor 83 to the yarn guide apparatus 72 and gearing 86a of one yarn supporter material 71 is attached in revolving-shaft 85a. Chain 89a for telling power is attached in Sprockets 84c and 84d. On the other hand, sprocket 84b is attached in the end of revolving-shaft 85b, and gearing 86b which gears with gearing 86a of the yarn supporter material 71 of another side is attached in the other end. Chain 89b for telling power is attached in Sprockets 84a and 84b.

[0061] Furthermore, this manufacturing installation may be equipped with bobbin 75a around which the yarn 90 supplied in the yarn supporter material 71 was twisted if needed. The yarn 90 which it lets out from bobbin 75a is supplied in the yarn supporter material 71 from the opening edge of the migration direction upstream of the horizontal array object 73 in the yarn supporter material 71, and passes through the inside of the member. Therefore, yarn 90 is conveyed through the inside of the yarn supporter material 71 so that it may be located inside the loop formation of rubber strand 16b at the longitudinal direction both ends of the horizontal array object 73. Thus, by letting yarn 90 pass to the both ends of the horizontal array object 73, rubber strand 16b is supported by yarn 90 on a production line. Consequently, in the horizontal array object 73, the array of rubber strand 16b is held by yarn 90, and the reinforcement of the horizontal elasticity compound sheet 77 improves. When the horizontal elasticity compound sheet 77 passes heating-cylinder 78a and 78b and the sheet becomes that a heating cylinder is likely to be pasted, yarn 90 serves to pull apart the horizontal elasticity compound sheet 77 from a heating cylinder.

[0062] Next, actuation of this manufacturing installation is explained.

[0063] First, rubber strand 16b lets out from a bobbin 75 with rotation actuation of the yarn guide apparatus 72, and the rubber strand 16b is supplied to the yarn supporter material 71 through the yarn guide apparatus 72. Supplied rubber strand 16b is twisted around the yarn supporter material 71 of a pair, and is inserted in in each screw slot 74a. As for inserted-in rubber strand 16b, the inside of screw slot 74a is sent to the longitudinal direction of the member by rotation actuation of each yarn supporter material 71. And the horizontal array object 73 of a rubber strand is formed between the yarn supporter material 71 of a pair of rubber strand 16b continuously supplied by rotation of the yarn guide apparatus 72.

[0064] Next, by nip rolls 76a and 76b, 11d of nonwoven fabrics is supplied to the top face of the horizontal array object 73, nonwoven fabric 11e is supplied to the inferior surface of tongue of the horizontal array object 73, and those nonwoven fabrics are put between the horizontal array object 73 and coincidence which were spent by rotation of the yarn supporter material 71 between nip roll 76a and 76b.

[0065] When the quality of the material of rubber strand 16b is thermoplastic elastomer, rubber strand 16b becomes the horizontal elasticity compound sheet 77 joined to nonwoven fabrics 11d and 11e by heating nip rolls 76a and 76b. Then, junction to rubber strand 16b and nonwoven fabrics 11d and 11e is strengthened by inserting the horizontal elasticity compound sheet 77 into heating-cylinder 78a and nip roll 76a, and inserting it into heating-cylinder 78b and nip roll 76b further. And the horizontal elasticity compound sheet 77 is considered as the roll 80 rolled round by winding roll 81e.

[0066] Like [when the basis weight of nonwoven fabrics 11d and 11e is small], with a production line, when conveyance of the horizontal elasticity compound sheet 77 is difficult, the yarn 90 of high intensity is inserted in the handle part of the both sides of the horizontal array object 73 etc. as mentioned above by inelasticity, and even if easy [in conveyance of the horizontal elasticity compound sheet 77] by the yarn 90, it is good. In this case, the part in which yarn 90 was inserted is removed and the horizontal elasticity compound sheet 77 can be used.

[0067] In the manufacturing installation shown in drawing 4 - drawing 6 , the nonwoven fabric was supplied to the both sides of the horizontal array object 73, and the horizontal elasticity compound sheet by which rubber strand 16b was sandwiched from the upper and lower sides with nonwoven fabrics 11d and 11e was manufactured. On the other hand, a horizontal elasticity compound sheet can also be manufactured by supplying only either of the nonwoven fabrics 11d and 11e, and joining to the horizontal array object 73.

[0068] Although drawing 4 and drawing 5 showed the case where the yarn guide apparatus 72 was a piece, the productivity of a horizontal elasticity compound sheet can be raised supplying two or more rubber strand by preparing many yarn feed hoppers, and by forming a yarn guide apparatus in multistage. Moreover, in order to produce the horizontal elasticity compound sheet with which rubber strands crossed diagonally the same with having explained in the manufacturing installation of drawing 2 or drawing 3 , a yarn guide apparatus may be formed in multistage. In this manufacturing installation, according to the configuration of the screw slots 74a and 74b formed in the yarn supporter material 71 of a pair, and the physical relationship of the screw slots on the pair, rubber strand 16b which it lets out from the yarn guide apparatus 72 can be mostly made parallel with a longitudinal direction, or can carry out a skew to a longitudinal direction.

[0069] Moreover, although drawing 4 - drawing 6 showed the example which makes rubber strand 16b unite with nonwoven fabrics 11d and 11e with the nip rolls 76a and 76b arranged between the yarn supporter material 71 of a pair The group of rubber strand 16b arranged in the longitudinal direction between the yarn supporter material 71 of a pair can be moved on heating-cylinder 78a with much yarn through which it circulates, and it can also be made to unite with the nonwoven fabric supplied on the cylinder.

[0070] Next, the ingredient used by each manufacturing installation mentioned above, the description of the manufacturing installation, etc. are explained in detail.

[0071] In the manufacture approach of this invention, what fabricated natural rubber, synthetic rubber, and thermoplastic elastomer in the shape of a strand is used as a class of rubber used as

the ingredient, i.e., the elasticity elastomer, of a rubber strand. As this rubber strand, the thing of various configurations, such as a thing of the shape of a rectangular tape, may be used not only for the thing of a round head but for a cross-section configuration, and the strand may consist of a monofilament, and a cross-section configuration may be the multifilament which is the aggregate of a filament. Moreover, spinning of the rubber strand is carried out just before the process which twists a rubber strand around yarn supporter material not only in the strand manufactured at the process other than the process explained with reference to drawing but in this invention, a rubber strand can be twisted around supporter material, or succeedingly, it is carrying out a laminating on a nonwoven fabric, and shortening of a process can also be attained. [0072] Moreover, in each manufacture approach mentioned above, using what was fabricated in the shape of a strand as an elastic body has the advantage that the strand fabricated so that vulcanization etc. might be given and it might be the easiest to demonstrate rubber elasticity can be used. Moreover, it is because it is suitable for using the rubber elasticity object of the minimal dose most effectively by arranging a strand efficiently in the flexible direction of a compound sheet. Moreover, generally a rubber elasticity object has a bad moldability, and especially the rubber elasticity object for which such flexible fitness, such as a spring material of the diaper which is having 200% or more of big telescopic motion repeated, is needed has a bad moldability. Then, it is most suitable to adopt shaping of the strand which is the simplest fabricating method.

[0073] By the manufacture approach mentioned above, the quality of the materials of a rubber strand are thermoplastic elastomer, synthetic rubber, natural rubber, etc. as mentioned above, and the strand which has 200% or more of rubber elasticity-elasticity is used. However, it does not require to the residual distortion at the time of recovering, after the rubber strand developed 200% being zero, and it can be used even if it has dozens of% of residual distortion.

[0074] In the manufacture approach of this invention, especially thermoplastic elastomer suits as the quality of the material of a rubber strand. Possible [junction of a rubber strand and a nonwoven fabric] for thermoplastic elastomer only with heat, from becoming simple [a process], cost can be markedly made cheap and a horizontal elasticity compound sheet can be manufactured.

[0075] As thermoplastic elastomer of a rubber strand, elastomers, such as a polyolefine system, synthetic rubber, a polyester system, a polyamide system, and a polyurethane system, are used. It expands and contracts for a high scale factor, and moreover, since the stress at the time of telescopic motion is small, it is [among these] most suitable [the synthetic-rubber system or polyurethane system to which copolymerization of styrene and the olefin was carried out] as an elastomer of a rubber strand. In addition, strands by heat etc., such as natural rubber with the difficult junction to a nonwoven fabric and vulcanization synthetic rubber, are pasted up on a nonwoven fabric by latexes, such as synthetic rubber and natural rubber, etc. among rubber strands.

[0076] The fiber which constitutes the nonwoven fabric used as the ingredient of a horizontal elasticity compound sheet means the fiber of the wide sense which means both a staple fiber (short fiber) and a continuous filament. The fiber may be a fiber of semi-synthetic fibers, such as the thing and rayon which consist of a fiber of natural fibers, such as a thing which consists of polymers for synthetic fibers, such as usual polypropylene, a polyamide, and polyester, and cotton, silk, and acetate.

[0077] The nonwoven fabric used in case a horizontal elasticity compound sheet is manufactured

needs to have at least 100% or more of ductility in the fixed direction. Thus, as an example of the nonwoven fabric which has 100% or more of ductility, there is a nonwoven fabric which the fiber arranged to the one direction, and the ductility of the nonwoven fabric of the array direction and direction of a right angle becomes 100% or more as indicated by JP,8-174764,A and JP,11-222759,A.

[0078] By the manufacture approach of this invention, it is the direction and the direction of a right angle which the fiber arranged, ductility is several % to dozens of % in the array direction of a fiber, the elongation stress of 100% or more of ductility of a nonwoven fabric is also large, and an elasticity compound sheet with dimensional stability is obtained in this direction.

[0079] As a nonwoven fabric for elasticity compound sheets, nonwoven fabrics which consist of a continuous glass fiber filament, such as a nonwoven fabric which extended the span bond nonwoven fabric or the melt blow nonwoven fabric, and a nonwoven fabric explained in full detail to the vertical extension nonwoven fabrics (JP,3-36948,B, JP,10-204767,A, etc.) of point invention by this invention persons or a nonwoven fabric which opened the tow and was arranged to the one direction, are used. Also to hundreds of telescopic motion of a repeat, these continuous glass fiber filaments do not have the omission omission of fiber, and suit the so-called lint free application. Moreover, the extended nonwoven fabric has reinforcement and dimensional stability in the extension direction, and the extended nonwoven fabric can also use the property by this extension with garments etc. from becoming a glossy nonwoven fabric further.

[0080] In this invention, although the nonwoven fabric for horizontal elasticity compound sheets was indicated to be the nonwoven fabric extended by the lengthwise direction, even if it is a nonwoven fabric extended to the 2-way, the nonwoven fabric with which balance in every direction has collapsed is also contained in the nonwoven fabric extended by the lengthwise direction (one direction) of this invention by making draw magnification of a lengthwise direction high.

[0081] Moreover, the nonwoven fabric with which it comes to arrange a staple fiber also suits an one direction as a nonwoven fabric for horizontal elasticity compound sheets. The nonwoven fabric which consists of a staple fiber is cotton-aesthetic property, and a feel is good and is liked for the application referring to the skin. There is a web of a card riser etc. as a nonwoven fabric which the fiber which consists of a staple fiber arranged.

[0082] Moreover, as another example of the nonwoven fabric which has 100% or more of ductility, by performing flexible processing, rib attachment processing including contraction processing or folding processing, and pleating, etc., you may process it into a span bond nonwoven fabric or the usual staple fiber nonwoven fabric so that it may have ductility in a longitudinal direction.

[0083] With flexible processing, not only flexible processing of the narrow sense which gives a softening agent to a nonwoven fabric but shrink-proofing, such as Sanforizing, and processing used as a soft nonwoven fabric with big ductility by physical means by which a rib is not observed by appearance, such as embossing, are included.

[0084] Contraction processing is processing which shrinks cloth physically or chemically, and it is common also in flexible processing mentioned above in part, including what is called milling processing with which a fiber is made to become entangled. There is an approach indicated by JP,6-57620,A etc. as an approach of making a lengthwise direction or a longitudinal direction contracting cloth physically.

[0085] Rib attachment processing prepares much regular or irregular small Siwa and **** in cloth including fold-up processing, pleating, etc., and processing which gives extensibility to cloth is said. A rib is put into a longitudinal direction, it considers as the example which enlarges ductility in a lengthwise direction, and SANHO rise processing (refer to U.S. Pat. No. 2324245 specification), mechanical shrink-proofing, such as a double width SUTAFIN box (refer to JP,5-41742,B), processing using the manufacture approach of the crepe paper in the paper manufacture industry, processing that puts a rib into a lengthwise direction combining two rollers which have many slots in shaft orientations are mentioned. Moreover, it can also consider as the nonwoven fabric which has elasticity in a lengthwise direction or a longitudinal direction by devising an embossing pattern. It is processing [which], and it is contained in rib attachment processing as used in this specification when a peach and a rib arise.

[0086] As for the nonwoven fabric for horizontal elasticity compound sheets, 200% or more of ductility is desirably required of an one direction at least 100% or more. When the ductility of the one direction of a nonwoven fabric was 100% or more, it has checked from the experimental result that 200% or more of elasticity to repeat is shown as a compound sheet with an elastomer.

[0087] The approach of this invention of manufacturing a horizontal elasticity compound sheet using these rubber strands and nonwoven fabrics has the process which manufactures the horizontal array object with which a rubber strand arranges and becomes a longitudinal direction mostly as mentioned above.

[0088] Although it is contained also when the rubber strand has arranged the horizontal array object of a rubber strand in the longitudinal direction (cross direction), i.e., the longitudinal direction of a nonwoven fabric, and the rubber strand is carrying out the skew a little from the longitudinal direction, a thing when an include angle with the smaller include angle which a longitudinal direction and a rubber strand make is smaller than 45 degrees is said.

[0089] A rubber strand has the advantage which takes the above horizontal arrangement in the point which can arrange a strand effective in the direction of the purpose with a simple means. Moreover, lateral elasticity can be given in the minimum amount of strands. Moreover, when the rubber strand is carrying out the skew a little, or when it crosses, there is also a merit from which the elongation tension of a horizontal elasticity compound sheet can be adjusted, and early **** tension is small and becomes a mellow load elongation curve in the compound sheet with extent of the slant.

[0090] A rubber elasticity property, ductility, endurance, etc. have the advantage which uses a rubber strand in this invention in the point which can use efficiently the established rubber strand manufactured appropriate. That is, it is because the width of face of selection of an ingredient side is wide that the strand with which it does not have the gestalt-fault to which the intersection part of elastic bodies becomes thick as compared with the case where the network of a rubber elasticity object, a nonwoven fabric, a film, etc. are used, and shaping was fabricated from difficult natural rubber latex can be used etc. Moreover, the target load elongation curve, a hysteresis curve, etc. are realizable in the minimum amount of rubber from those things. It is important also from the field of such a product property that there are few amounts of rubber to be used not only with the field of economical efficiency but the product of these days expected the thin and light product.

[0091] By the manufacture approach of this invention, the means which twists the rubber strand on supporter material is used. The typical thing of the means which twists around supporter material the usual yarn which does not have rubber elasticity has the technique (France addition

JP,79765,B) developed by SHABANO of France, and various the amelioration invention is also made (France JP,1208968,B, JP,47-14791,B, JP,51-2543,B, JP,51-78879,A, etc.). These are the examples of a means to manufacture the horizontal array object of yarn, by leading usual yarn to the rotating yarn guide apparatus, and twisting yarn around the long and slender pivotable yarn supporter material of the pair which set spacing and has been arranged.

[0092] Moreover, a rubber strand makes it run the sheet-like belt which is yarn supporter material, or the form-of-a-rope belt of a pair as other examples which twist another different yarn around supporter material, and has the method which twists yarn around the supporter material. As a typical example in the case of the usual yarn which does not have rubber elasticity, there are some which were indicated by United States Patent specification No. 3041230 and JP,47-49796,B.

[0093] Moreover, the typical example which twists around cylinder-like supporter material the usual yarn which does not have rubber elasticity as an example which twists another different yarn from a rubber strand around supporter material is indicated by United States Patent specification No. 2797728 and JP,40-35506,Y.

[0094] By using the manufacture approach of the network established with the usual yarn which is not rubber, this invention uses effectively the elastic body used in case a horizontal elasticity compound sheet is manufactured, and makes it possible to manufacture a horizontal elasticity compound sheet at a high speed in a simple manufacture process. That is, this invention is adapted for the rubber strand which has 200% or more of elasticity in the horizontal array means of the above-mentioned usual yarn, and the description is in the point of having enabled it to manufacture a horizontal elasticity compound sheet, by joining the rubber strand to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction further.

[0095]

[Example] (Example 1) The horizontal elasticity compound sheet was produced using the manufacturing installation shown in drawing 2 . The vertical array nonwoven fabric of basis-weight 20 g/m² which extended the basis weight (mass per unit area) of 50g/the span bond nonwoven fabric made from polypropylene of m² 2.5 times to the lengthwise direction, and was obtained as a nonwoven fabric 11 was used. The nonwoven fabric 11 with a width of face of 1200mm is twisted around the cylindrical supporter material 13 with a diameter of 320mm by which mold release processing was carried out of Teflon (trademark). And it is made to run a nonwoven fabric 11 on the cylindrical supporter material 13, and after spraying natural rubber latex on the vulcanized natural rubber strand (total fineness of 250tex), the rubber strand is twisted at intervals of 2.5mm pitch on the nonwoven fabric 11 it runs.

[0096] Thus, the horizontal elasticity compound sheet was manufactured for the rubber strand a laminating and by joining on the nonwoven fabric 11. The basis weight of the obtained horizontal elasticity compound sheet was 172 g/m², and residual distortion was 7% when 200% of telescopic motion was repeated 20 times in the longitudinal direction of a sheet.

[0097] (Example 2) The horizontal elasticity compound sheet was produced using the manufacturing installation shown in drawing 3 . The pair twisted the strand (total fineness of 180tex) of SEBS (styrene-ethylene butylene-styrene) system resin (Clayton G1857 made from shell JAPAN) yarn supporter material 31 at intervals of 5mm pitch, and the horizontal array object 34 was formed.

[0098] Then, the card web of the cotton which has 100% or more of ductility in a longitudinal direction by contraction processing was joined to the horizontal array object 34, and the

horizontal elasticity compound sheet of basis-weight 145 g/m² was manufactured. Even if it repeated 200% of telescopic motion 10 times in the longitudinal direction of a sheet, the horizontal elasticity compound sheet with which residual distortion has 15% of elasticity was obtained.

[0099]

[Effect of the Invention] As explained above, according to the manufacture approach of the horizontal elasticity compound sheet of this invention, carry out the laminating of the rubber strand on the nonwoven fabric by which the ** form was carried out to the shape of a cylindrical shape along with the peripheral face of cylindrical supporter material, or Or by joining a horizontal array object to a nonwoven fabric, after twisting a rubber strand around the yarn supporter material of the pair which kept spacing in the longitudinal direction and has been arranged and forming a horizontal array object The ingredient of a rubber strand becomes possible [being able to manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently by the simple and high-speed approach, and mass-producing a horizontal elasticity compound sheet by low cost also in the minimum amount,]. Namely, the elastic body used as an ingredient of a rubber strand can be used effectively, and it is effective in becoming possible to manufacture a horizontal elasticity compound sheet at a high speed in a simple manufacture process. Moreover, manufacture of a horizontal elasticity compound sheet with the advantage that early **** tension is small and becomes a mellow load elongation curve is attained by carrying out the oblique intersection of the strand on a nonwoven fabric.

[0100] The horizontal elasticity compound sheet obtained by the manufacture approach of this invention is used suitable for garments, such as the flexible elastic section of hygienic goods, such as the strap of elasticity dressings, a supporter, the cuff of clothing, a flexible tape, a stretch belt, and a brassiere, a stomach band, a gravida band, a ***** stop of a glove or socks, a diaper, and an incontinencia pad, medicine, etc.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the manufacture approach of a horizontal elasticity compound sheet of coming to allot a rubber strand in a longitudinal direction on a nonwoven fabric. Especially this invention produces the horizontal array object of a strand with a simple means to twist a rubber strand around supporter material, and relates to the manufacture approach of the horizontal elasticity compound sheet by joining the strand on the nonwoven fabric which has at least 100% or more of ductility in a longitudinal direction. Especially the horizontal elasticity compound sheet manufactured by the process is used for garments, such as the flexible elastic sections, such as elasticity dressings, a supporter, a cuff of clothing, and a diaper, medicine, hygienic goods, etc.

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PRIOR ART

[Description of the Prior Art] Various techniques are proposed from the former as the nonwoven fabric and the elastic body are indicated by JP,3-213543,A, JP,8-174764,A, etc. about the elasticity compound sheet which comes to carry out a laminating. By the manufacture approach of the elastic body indicated by JP,3-213543,A, thin band-like elastic bodies, such as a rubber thread and Taira rubber, are first supplied in the state of expanding between a nonwoven fabric on top and a nonwoven fabric at the bottom at a longitudinal direction. And a nonwoven fabric on top and a nonwoven fabric at the bottom are partially pasted up using the adhesive property of a nonwoven fabric, and a large number formation of the part for a part for jointing and a non-adhesion part is carried out about a nonwoven fabric on top, respectively. Thereby, the elastic body with which it comes to unite the elastic body of an expanding condition with the nonwoven fabric of a top face and an inferior surface of tongue is produced.

[0003] The complex with which the flexible direction was regulated is indicated by JP,8-174764,A. As for the complex, it comes to carry out the laminating of the elasticity elastomer layer to an extension continuous glass fiber web. An extension continuous glass fiber web extends the continuous glass fiber web formed by carrying out spinning of the thermoplastics to an one direction, and makes the fiber of the web arrange in the about 1 direction. Thus, by having constituted the complex with which the flexible direction was regulated, aesthetic property is good and the elasticity compound sheet which has moderate elasticity is obtained.

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EFFECT OF THE INVENTION

[Effect of the Invention] As explained above, according to the manufacture approach of the horizontal elasticity compound sheet of this invention, carry out the laminating of the rubber strand on the nonwoven fabric by which the ** form was carried out to the shape of a cylindrical shape along with the peripheral face of cylindrical supporter material, or Or by joining a horizontal array object to a nonwoven fabric, after twisting a rubber strand around the yarn supporter material of the pair which kept spacing in the longitudinal direction and has been arranged and forming a horizontal array object The ingredient of a rubber strand becomes possible [being able to manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently by the simple and high-speed approach, and mass-producing a horizontal elasticity compound sheet by low cost also in the minimum amount,]. Namely, the elastic body used as an ingredient of a rubber strand can be used effectively, and it is effective in becoming possible to manufacture a horizontal elasticity compound sheet at a high speed in a simple manufacture process. Moreover, manufacture of a horizontal elasticity compound sheet with the advantage that early **** tension is small and becomes a mellow load elongation curve is attained by carrying out the oblique intersection of the strand on a nonwoven fabric.

[0100] The horizontal elasticity compound sheet obtained by the manufacture approach of this invention is used suitable for garments, such as the flexible elastic section of hygienic goods, such as the strap of elasticity dressings, a supporter, the cuff of clothing, a flexible tape, a stretch belt, and a brassiere, a stomach band, a gravida band, a ***** stop of a glove or socks, a diaper, and an incontinentia pad, medicine, etc.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, by development of charges of garments material, such as a diaper, though it is quality, the manufacture approach which can produce an elasticity compound sheet for high productivity cheaply has been searched for at recent years. For that purpose, using the elastomer to be used effectively or that a manufacture process is simple, and manufacturing an elasticity compound sheet at a high speed have been called for. [0005] In case the purpose of this invention manufactures the horizontal elasticity compound sheet which has elasticity in a longitudinal direction, it can use the elastic body to be used effectively and is to offer the manufacture approach of a horizontal elasticity compound sheet which can manufacture a horizontal elasticity compound sheet at a high speed in a simple manufacture process.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. Said nonwoven fabric a ** form in the shape of a cylindrical shape The cylindrical supporter material for supporting by carrying out, The process which prepares the yarn guide apparatus which guides a rubber strand on the nonwoven fabric which rotated the outside of said cylindrical supporter material by having made the medial axis of this cylindrical supporter material into the center of rotation, and was supported by said cylindrical supporter material, The process which leads the nonwoven fabric which has 100% or more of ductility in a longitudinal direction to the peripheral face of said cylindrical supporter material, and carries out the ** form of said nonwoven fabric to the shape of a cylindrical shape continuously along with the peripheral face of said cylindrical supporter material, While making it run said nonwoven fabric by which the ** form was carried out to the shape of a cylindrical shape in the direction parallel to the axis of said cylindrical supporter material By rotating said yarn guide apparatus, showing the rubber strand which has 200% or more of elasticity to said nonwoven fabric on said cylindrical supporter material with said yarn guide apparatus The process which twists said rubber strand on said nonwoven fabric it runs by the shape of a cylindrical shape, It has the process which joins the rubber strand twisted on it to said nonwoven fabric it runs, and the process which develops continuously in a flat-surface configuration and takes out said nonwoven fabric from the shape of a cylindrical shape in it, pulling apart the nonwoven fabric to which said strand was joined from said cylindrical supporter material.

[0007] In the above-mentioned invention, the nonwoven fabric which has 100% or more of ductility is first led to a longitudinal direction at cylindrical supporter material, the ** form of the nonwoven fabric is carried out to the shape of a cylindrical shape along with the peripheral face of cylindrical supporter material, and it supports by cylindrical supporter material. The perimeter of cylindrical supporter material is made to rotate a yarn guide apparatus, while making it run a cylindrical shape-like nonwoven fabric in the direction parallel to the axis of cylindrical supporter material, showing the rubber strand which has 200% or more of ductility to the nonwoven fabric on cylindrical supporter material with a yarn guide apparatus. A horizontal elasticity compound sheet is produced by twisting a rubber strand on a cylindrical shape-like nonwoven fabric by this, next joining the rubber strand to a nonwoven fabric. Next, a flat horizontal elasticity compound sheet is obtained by developing continuously in a flat-surface configuration and taking out from the shape of a cylindrical shape in it, pulling apart the

nonwoven fabric to which the rubber strand was joined from cylindrical supporter material. Since the ingredient of a rubber strand can manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently also in the minimum amount by the simple and high-speed approach according to such an approach, it becomes possible to mass-produce a horizontal elasticity compound sheet by low cost. Moreover, when the horizontal elasticity compound sheet with which rubber strands crossed diagonally on the nonwoven fabric by using two or more yarn guide apparatus is produced, with the sheet, there is also a merit that early **** tension is small and becomes a mellow load elongation curve.

[0008] Moreover, this invention is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. The yarn supporter material of the pair supports said strand in case the laminating of said rubber strand is carried out on said nonwoven fabric, and holds the condition of having kept spacing of abbreviation regularity in the longitudinal direction, and it runs in the same direction mutually, The process which prepares the yarn guide apparatus to which it shows this rubber strand so that the perimeter of the yarn supporter material of this pair may be rotated and a rubber strand may be twisted around the yarn supporter material of said pair, With said yarn guide apparatus turning around those perimeters, running a lengthwise direction the yarn supporter material of said pair By twisting around the yarn supporter material of said pair the rubber strand which has 200% or more of elasticity It has the process which forms the horizontal array object with which it comes to arrange said rubber strand in a longitudinal direction mostly between the yarn supporter material of said pair, and the process which joins said horizontal array object to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction, and produces a horizontal elasticity compound sheet.

[0009] In the above-mentioned invention, the rubber strand which has 200% or more of elasticity is twisted around the yarn supporter material of a pair, making the perimeter of those yarn supporter material rotate a yarn guide apparatus, while holding the condition of having kept almost fixed spacing for the yarn supporter material of a pair in the longitudinal direction and running a lengthwise direction. Thereby, the horizontal array object with which it comes to arrange a rubber strand in a longitudinal direction mostly is formed between the yarn supporter material of a pair. Next, a horizontal elasticity compound sheet is produced by joining the horizontal array object to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction. It enables it for the ingredient of a rubber strand to be able to manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently by the simple and high-speed approach, and to mass-produce a horizontal elasticity compound sheet also in the minimum amount like the approach using cylindrical supporter material, as mentioned above, also by such approach, at low cost.

[0010] Furthermore, this invention is the manufacture approach of a compound sheet of coming to join a rubber strand on a nonwoven fabric, and having elasticity in a longitudinal direction. While keeping spacing in a longitudinal direction and being arranged so that said rubber strand may be supported in case the laminating of said rubber strand is carried out on said nonwoven fabric The supporter material of the pair which each rotates in order to move the rubber strand which each has the engagement section which engages with this rubber strand in order to move the rubber strand to support to a lengthwise direction, and engaged with this engagement section to a lengthwise direction, The process which prepares the yarn guide apparatus to which it shows a rubber strand so that it may rotate around the supporter material of this pair, a rubber strand

may be made to engage with the engagement section of each the material of said supporter and a rubber strand may be twisted around the supporter material of said pair, Twisting around the supporter material of said pair the rubber strand which has 200% or more of elasticity with said rotating yarn guide apparatus, and making this rubber strand engage with said engagement section By making it move to each rotation actuation of said supporter material with the rubber strand which engaged with said engagement section The process which forms the horizontal array object with which it comes to arrange said rubber strand in a longitudinal direction between the supporter material of said pair mostly, It has the process which joins said horizontal array object which moves when the supporter material of said pair rotates to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction, and produces a horizontal elasticity compound sheet.

[0011] In the above-mentioned invention, a horizontal elasticity compound sheet is produced using the yarn supporter material of the pair which rotates in order to move a rubber strand to a lengthwise direction. Yarn supporter material has the engagement section which engages with a rubber strand, and the rubber strand which engaged with the engagement section is moved to an one direction with rotation actuation of yarn supporter material. First, in a longitudinal direction, spacing is kept, the yarn supporter material of a pair is arranged, the rubber strand which has 200% or more of elasticity is guided, it twists around the yarn supporter material of a pair, and the rubber strand is made to engage with the engagement section of yarn supporter material with the yarn guide apparatus turning around those perimeters. The rubber strand which engaged with the engagement section is moved to a lengthwise direction by rotation actuation of yarn supporter material, twisting a rubber strand around the yarn supporter material of a pair such. A horizontal elasticity compound sheet is manufactured by joining the horizontal array object which the horizontal array object with which it comes to arrange a rubber strand in a longitudinal direction mostly was formed between the yarn supporter material of a pair by this, next was formed to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction. It enables it for the ingredient of a rubber strand to be able to manufacture the horizontal elasticity compound sheet which can demonstrate elasticity most efficiently by the simple and high-speed approach, and to mass-produce a horizontal elasticity compound sheet also in the minimum amount, also by such approach, at low cost.

[0012] With the "lengthwise direction" used in this invention when explaining the production process of a horizontal elasticity compound sheet, the array direction of the fiber of a nonwoven fabric, etc. Those feed directions at the time of manufacturing a horizontal elasticity compound sheet and a nonwoven fabric are meant. The "longitudinal direction" used when explaining the array direction of a rubber strand, the ductility of a nonwoven fabric, the flexible direction of a horizontal elasticity compound sheet, etc. means a lengthwise direction and a right-angled direction, i.e., the cross direction of a nonwoven fabric or a horizontal elasticity compound sheet.

[0013] The "ductility" in this invention applies to JIS-L1095. That is, in the die-length direction, width of face opens spacing of 10cm, grasps the web which is 5cm, it pulls by speed-of-testing 30 cm/min, and the elongation over the original die length when a web fractures is expressed with %.

[0014] With the "strand" in this invention, a flexible material others, endless [comparatively thick], or semi- endless is also usually included. [flexible material / endless / which is called a filament / comparatively thin / or semi- endless] Although it is about hundreds of tex even when calling it a filament, and the fineness is large, as for the "strand" in this invention, that whose

fineness is thousands of tex is also contained. In addition, a "strand" may be called total fineness in order to distinguish from the fineness of each strand which each thin strands may gather, may constitute a thick strand, and constitutes the fineness of the thick strand in that case.

[0015] After giving fixed elongation, applying tension to a strand, the "elasticity of a strand" in this invention will mean the property which the elongation recovers near the original die length in rubber elasticity, if the tension is canceled. at least 50% of the ductility given to the strand although a strand did not need to return to the original die length completely as a rate recovered elastically -- desirable -- 80% (20% of residual ductility) -- more -- desirable -- 90% or more (10% or less of residual ductility) recovery -- carrying out -- ****ing .

[0016]

[Embodiment of the Invention] Next, the gestalt of operation of this invention is explained with reference to a drawing.

[0017] Drawing 1 is the top view showing the horizontal elasticity compound sheet produced by the manufacture approach of this invention.

[0018] Rubber strand 2a arranged by the right-angled longitudinal direction to the lengthwise direction (the die-length direction) on the nonwoven fabric 1 prolonged in the lengthwise direction where the horizontal elasticity compound sheet shown in drawing 1 (a) is shown by the arrow head A is a laminating and the thing which it comes to join. It comes to arrange a fiber in the die-length direction (lengthwise direction), and the nonwoven fabric 1 has 100% or more of ductility in the longitudinal direction (cross direction). Rubber strand 2a has 200% or more of elasticity in the die-length direction. In this case, strand 2a is almost parallel to the longitudinal direction of a nonwoven fabric 1, and the include angle accomplished in a straight line parallel to a longitudinal direction serves as zero mostly.

[0019] The horizontal elasticity compound sheet shown in drawing 1 (b) is a thing when rubber strand 2b by which the laminating was carried out carries out a skew for some and is arranged to a longitudinal direction on a nonwoven fabric 1, and drawing 1 (b) has shown extent of the skew of rubber strand 2b at an angle of [α] the smaller one among the include angles with a straight line parallel to a longitudinal direction to make. In this invention, it is desirable still more desirable for an include angle α to be smaller than 45 degrees, and 10 or less degrees is the most desirable 30 or less degrees.

[0020] rubber strand 2c which crosses diagonally with rubber strand 2b in the horizontal elasticity compound sheet which showed the horizontal elasticity compound sheet shown in drawing 1 (c) to drawing 1 (b) -- a nonwoven fabric 1 top -- further -- a laminating -- and it is joined and constituted. To the longitudinal direction, rubber strand 2c carries out the skew of some, and is arranged, and extent of the skew is shown at an angle of [β] the smaller one by drawing 1 (c) by the case where it is shown in drawing 1 (c) among the include angles with a straight line parallel to a longitudinal direction to make. The skew of the rubber strand 2c does not necessarily have to be carried out to the longitudinal direction, and it may be almost parallel to a longitudinal direction. Although rubber strand 2b and each skew include angle α and β of 2c do not need to be equal, it is desirable for each skew include angle to be 45 or less degrees.

[0021] Each horizontal elasticity compound sheet shown in drawing 1 (a) - drawing 1 (c) has big elasticity in the longitudinal direction, and is used for it suitable for garments, such as the flexible elastic section of hygienic goods, such as the strap of elasticity dressings, a supporter, the cuff of clothing, a flexible tape, a stretch belt, and a brassiere, a stomach band, a graviora band, a ***** stop of a glove or socks, a diaper, and an incontinentia pad, medicine, etc.

[0022] Drawing 2 is the perspective view showing the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[0023] In the manufacturing installation of the horizontal elasticity compound sheet of this operation gestalt, the ring-like turntable 14 is attached in the top face of fixed-angular-table 14a of the shape of a ring fixed by supporter material 14b as shown in drawing 2 through support device 14c. Each medial axis of fixed-angular-table 14a and a turntable 14 is both arranged on the same straight line parallel to the direction of a vertical. It is supported by support device 14c so that a turntable 14 may become pivotable on fixed-angular-table 14a by making the medial axis into the center of rotation. The bobbin 15 around which the rubber strand 16 is wound is attached to the top face of a turntable 14 a large number picking pivotable. Although only two bobbins 15 are shown by drawing 2 since it is simple, many bobbins 15 are arranged along with the circumferencial direction of a turntable 14 on the top face of a turntable 15. A yarn guide apparatus consists of a bobbin 15 of these large number, a turntable 14, etc., and the rubber strand 16 is guided by the equipment to the lateral surface of the nonwoven fabric 11 on the cylindrical supporter material 13. The rubber strand 16 has 200% or more of elasticity in the die-length direction.

[0024] The slot where a belt 28 is inserted in the peripheral face of a turntable 14 is formed. The belt 28 is hung on the slot formed in the peripheral face of a turntable 14, and the pulley 27 attached in the end section of a shaft 26. Gear 25b was attached in the other end of a shaft 26, and gear 25b has geared with gear 25a attached in the revolving shaft of a motor 24. The power of a motor 24 is told to a turntable 14 through Gears 25a and 25b, a shaft 26, a pulley 27, and a belt 28 with drive actuation of a motor 24, and a turntable 14 is rotated.

[0025] Moreover, the manufacturing installation of this operation gestalt is equipped with the cylindrical supporter material 13 which passes along the inside of fixed-angular-table 14a and a turntable 14. The cylindrical supporter material 13 is being fixed so that the medial axis may be arranged on fixed-angular-table 14a and the same straight line as the medial axis of a turntable 14. Near the part below fixed-angular-table 14a of the cylindrical supporter material 13, the guide 12 to which it shows the band-like nonwoven fabric 11 sent into the cylindrical supporter material 13 is formed. The guide 12 has the curve side which leads a nonwoven fabric 11 to the peripheral face of the cylindrical supporter material 13 so that foaming of the nonwoven fabric 11 of a flat-surface configuration may be carried out to the shape of a cylindrical shape along with the peripheral face of the cylindrical supporter material 13. The cylindrical supporter material 13 is for supporting a nonwoven fabric 11 in the state of the shape of a cylindrical shape by touching the medial surface of the nonwoven fabric 11 by which the ** form was carried out to the shape of a cylindrical shape. It comes to arrange a fiber in a lengthwise direction, and the nonwoven fabric 11 has 100% or more of ductility in a longitudinal direction, i.e., the cross direction.

[0026] Above the turntable 14 of the cylindrical supporter material 13, many heating rollers 18 for joining the rubber strand 16 from a bobbin 15 are formed on the nonwoven fabric 11 which is in contact with the peripheral face of the cylindrical supporter material 13. Two or more heating rollers 18 are put in order along with the circumferencial direction of the cylindrical supporter material 13, and each heating roller 18 is supported pivotable, after the medial axis has become a right angle to the direction of a vertical. A nonwoven fabric 11 and the rubber strand 16 are put between each heating roller 18 and the cylindrical supporter material 13, and the rubber strand 16 is joined on a nonwoven fabric 11 by heating them by the heating roller 18.

[0027] Furthermore, above the heating roller 18 of the cylindrical supporter material 13, the knife 21 as a cutting means to cut the rubber strand 16 near the crosswise edge of a nonwoven fabric 11, and the guidance implement 22 guided so that a nonwoven fabric 11 may be developed in a flat-surface configuration from the shape of a cylindrical shape after a knife 21 cuts the rubber strand 16 are formed. The nip rolls 23a and 23b of the pair which takes over the nonwoven fabric 11 led to the guidance implement 22 by the guidance implement 22 in near are arranged. These nip rolls 23a and 23b are the conveyance means for conveying a nonwoven fabric 11 within a manufacturing installation, and a nonwoven fabric 11 is supplied to a guide 12 by taking over actuation of the nonwoven fabric 11 with these rolls by the upstream of a conveyance path. On the cylindrical supporter material 13, the nonwoven fabric 11 by which the ** form was carried out to the shape of a cylindrical shape along with the peripheral face is run by the direction parallel to the direction of an axis of the shape of the cylindrical shape, i.e., a lengthwise direction, along with the peripheral face of the cylindrical supporter material 13.

[0028] Next, the actuation of a manufacturing installation shown in drawing 2 is explained.

[0029] First, the nonwoven fabric 11 sent into the guide 12 is continuously twisted around the peripheral face of the cylindrical supporter material 13 with a guide 12. Thereby, along with the peripheral face of the cylindrical supporter material 13, the ** form of the nonwoven fabric 11 is carried out to the shape of a cylindrical shape, and where the shape of the cylindrical shape is held, a nonwoven fabric 11 moves the cylindrical supporter material 13 top to a lengthwise direction toward the upper part. Around [some] the nonwoven fabric 11 which moves in the cylindrical supporter material 13 top, the turntable 14 is rotating by the motor 24. According to rotation of this turntable 14, from the bobbin 15, the rubber strand 16 is solved and the rubber strand 16 which was able to be solved coils around the nonwoven fabric 11 on the cylindrical supporter material 13. Thereby, the horizontal array object 17 with which it comes to arrange the rubber strand 16 in a longitudinal direction mostly is formed on the nonwoven fabric 11 on the cylindrical supporter material 13, i.e., the member.

[0030] When the quality of the material of the rubber strand 16 is thermoplastic elastomer, the joint 19 of a nonwoven fabric 11 and the rubber strand 16 is partially formed by the heating roller 18 which puts a nonwoven fabric 11 and the rubber strand 16 between the cylindrical supporter material 13, and is rotating. Although the heating roller 18 is not illustrated by drawing 2, it is desirable for the rotation drive to be carried out by the driving means of a motor etc.

[0031] After the rubber strand 16 is separated with a knife 21 near the crosswise both ends of a nonwoven fabric 11, the horizontal elasticity compound sheet 20 to which it comes to join a nonwoven fabric 11 and the rubber strand 16 by many heating rollers 18 partially is pulled apart from the cylindrical supporter material 13, and it is continuously developed by the flat from the shape of a cylindrical shape with the guidance implement 22 to a flat-surface configuration, and it is returned. Thus, the horizontal elasticity compound sheet 20 taken out from the cylindrical supporter material 13 is taken over by nip rolls 23a and 23b.

[0032] After the horizontal elasticity compound sheet 20 with which the rubber strand 16 was partially joined on the nonwoven fabric 11 is made into a flat, further, by the whole, it joins the rubber strand 16 to a nonwoven fabric 11, and unifies in many cases.

[0033] Although the turntable 14 showed one example by drawing 2, as shown in drawing 1 (c), rubber strands can produce the oblique intersection rubber array object which crossed diagonally mutually by forming two turntables 14 in a manufacturing installation, and making hard flow rotate two turntables 14 of each other. And the horizontal elasticity compound sheet of a

configuration of having been shown in drawing 1 (c) is manufactured by carrying out the laminating of the skew rubber array object on a nonwoven fabric 11. In this manufacturing installation, by adjusting the feed rate of a nonwoven fabric 11, and the rotational speed of a turntable 14, the rubber strand 16 by which a laminating is carried out on a nonwoven fabric 11 can be mostly made parallel with a longitudinal direction, or can carry out a skew to a longitudinal direction.

[0034] In addition, although drawing 2 showed equipment in case the quality of the material of the rubber strand 16 is thermoplastic elastomer, when the quality of the material of the rubber strand 16 is natural rubber which does not show thermoplasticity, and the rubber strand 16 lets out from a bobbin 15, the adhesives supply means to the rubber strand 16 is needed, such as carrying out the spray of the adhesives to the rubber strand 16, and applying them to it.

[0035] Drawing 3 is the perspective view showing other examples of the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[0036] At the manufacturing installation shown in drawing 3, the yarn supporter material 31 of the shape of a belt of the pair which kept spacing in the longitudinal direction and was mutually stretched in the parallel condition is circulated, and the horizontal array object 34 is produced by twisting rubber strand 16a around the yarn supporter material 31 of these pairs. And 37 is manufactured in a horizontal elasticity compound sheet by joining the horizontal array object 34 to a nonwoven fabric. In this manufacturing installation, one yarn supporter material 31 is stretched by belt pulley 42a attached in the end section of shaft 41a, belt pulley 42b attached in the end section of shaft 41b, belt pulley 42c attached in the end section of shaft 41c, and the end section of a roll 50 among the yarn supporter material 31 of a pair. The yarn supporter material 31 of another side is stretched by belt pulley 42a attached in the other end of shaft 41a, belt pulley 42b attached in the other end of shaft 41b, belt pulley 42c attached in the other end of shaft 41c, and the other end of a roll 50.

[0037] Gear 46c is attached in one belt pulley 42c, and gear 46b which gears with the gear 46c is attached in the revolving shaft of motor 46b. By carrying out the rotation drive of the motor 46b, the power of the motor 46b is told to shaft 41c and belt pulley 42c of the both ends of shaft 41c through Gears 46b and 46c. Thereby, belt pulley 42c of a shaft 41 and a pair rotates, and where almost fixed spacing is kept in a longitudinal direction between the yarn supporter material 31 of a pair, each yarn supporter material 31 is run by the lengthwise direction at the same rate.

[0038] The part between belt pulley 42a in the yarn supporter material 31 of a pair and a roll 50 passes along the inside of the ring 32 which constitutes the device for twisting rubber strand 16a around those yarn supporter material 31. The medial axis of a ring 32 is parallel to the transit direction of the yarn supporter material 31 which passes the inside. This ring 32 is supported pivotable considering the medial axis of a ring 32 as the center of rotation with two or more rollers 49 which touch that peripheral face. Internal-tooth 32a on a par with the circumferencial direction is formed in the inner skin of a ring 32. In internal-tooth 32a, gear 45a attached in the shaft connected with the revolving shaft of motor 46a has geared. When the power of motor 46a is told to a ring 32 by gear 45a and internal-tooth 32a, a ring 32 rotates the perimeter of the one section each of the yarn supporter material 31 of a pair.

[0039] Moreover, many bobbins 33 located in the inside are attached in the ring 32. Each bobbin 33 is attached in the ring 32 by shaft 33a pivotable. Although only one bobbin 33 is shown by drawing 3 since it is simple, many bobbins 33 are arranged in on the inner skin of a ring 32 along

with the circumferencial direction. Rubber strand 16a is wound around each bobbin 33. Rubber strand 16a has 200% or more of elasticity in the die-length direction. Furthermore, the interior material 53 of a proposal in which the pinhole for guiding rubber strand 16a which begins to be rolled from a bobbin 33 was formed is attached to the inner skin of a ring 32 two or more picking corresponding to each bobbin 33. The yarn guide apparatus turning around the perimeter of the yarn supporter material 31 of a pair consists of these rings 32, many bobbins 33, interior material 53 of a proposal, etc. By the yarn guide apparatus, rubber strand 16a is guided so that rubber strand 16a may be twisted around the yarn supporter material 31 of a pair in rubber strand 16a. [0040] In the yarn supporter material 31 of a pair, the table 48 on which each yarn supporter material 31 is engaged so that it may prevent that spacing of the yarn supporter material 31 becomes narrow may be formed in the part around which the rubber strand 31 is twisted, and its near. Accommodation bolt 48b for adjusting the width of face is attached in the table 48. Moreover, slot 48a with which the yarn supporter material 31 engages possible [sliding] is formed in the both-sides side of table 48b. By adjusting the width of face of a table 48 by accommodation bolt 48b, the condition of having engaged with each yarn supporter material 31 fang-furrow 48a is held.

[0041] Roll 43b for supplying nonwoven fabric 11a to the space between the yarn supporter material 31 of a pair is arranged at the upstream rather than the ring 32 in the transit direction of the yarn supporter material 31. It comes to arrange a fiber in a lengthwise direction, and nonwoven fabric 11a has 100% or more of ductility in the longitudinal direction. Above roll 43b, roll 43a for sending out nonwoven fabric 11a towards the roll 43b is arranged. Moreover, by the downstream, mold release sheet 36b which mold release sheet 36a stretched by heating-cylinder 35a and roll 44a with the yarn supporter material 31 up side of a pair ran, and was stretched by heating-cylinder 35b and roll 44b with the yarn supporter material 31 down side of a pair is running rather than the ring 32 in the transit direction of the yarn supporter material 31. Each heating cylinder is arranged so that the mold release sheets 36a and 36b may be put among heating cylinders 35a and 35b. The slot into which the yarn supporter material 31 gets is formed in each both ends of heating cylinders 35a and 35b. Furthermore, above the yarn supporter material 31 of a pair, roll 43c for sending in nonwoven fabric 11b from the bottom among the mold release sheets 36a and 36b is arranged. Below heating-cylinder 35a, the rolls 43d and 43e for sending in nonwoven fabric 11c from the bottom among the mold release sheets 36a and 36b are arranged. It comes to arrange a fiber in a lengthwise direction, and nonwoven fabrics 11b and 11c also have 100% or more of ductility in the longitudinal direction.

[0042] The quality of the material of rubber strand 16a is thermoplastic elastomer, and in order to join rubber strand 16a to each of nonwoven fabrics 11a, 11b, and 11c, heating cylinders 35a and 35b and the mold release sheets 36a and 36b are formed. The mold release sheets 36a and 36b through which it circulates by Rolls 44a and 44b and heating cylinders 35a and 35b run by the yarn supporter material 31 and this **. Thereby, junction to nonwoven fabrics 11a-11c and rubber strand 16a is performed by the nip of heating cylinders 35a and 35b between mold release sheet 36a and 36b.

[0043] Above the roll 50, the shaft which equipped both ends with the rotation knife 47 which rotates with the roll is arranged. The rotation knife 47 of the pair with which the shaft was equipped is for cutting rubber strand 16a twisted around the yarn supporter material 31 near each yarn supporter material 31. Roll 43f is arranged near the shaft equipped with the rotation knife 47 of a pair, and the horizontal elasticity compound sheet 37 which seceded from the yarn

supporter material 31 is sent out via roll 43f by cutting rubber strand 16a with the rotation knife 47 to the winding roll 38 so that it may mention later. The laminating of rubber strand 16a and the nonwoven fabrics 11b and 11c is carried out, and the horizontal elasticity compound sheet 37 is constituted by nonwoven fabric 11a so that it may mention later. The winding roll 38 is rotated by the non-illustrated rotation driving gear, and the horizontal elasticity compound sheet 37 is rolled round by the winding roll 38. The driving gear made to rotate the winding roll 38 is a conveyance means for conveying nonwoven fabrics 11a, 11b, and 11c along with a production line, and each of nonwoven fabrics 11a, 11b, and 11c is supplied to a production line by taking over actuation of the horizontal elasticity compound sheet 37 with the winding roll 38.

[0044] Next, actuation of the manufacturing installation constituted as mentioned above is explained.

[0045] First, nonwoven fabric 11a is supplied to the space between these yarn supporter material 31 with Rolls 43a and 43a, running a lengthwise direction the yarn supporter material 31 of a pair. Nonwoven fabric 11a and the yarn supporter material 31 of a pair pass the inside of the revolving uptake ring 32. In the case of the passage, the yarn supporter material 31 of a pair and nonwoven fabric 11a coil around rubber strand 16a from each bobbin 33 according to rotation of a ring 32. Thereby, the horizontal array object 34 with which it comes to arrange rubber strand 16a in a longitudinal direction between the yarn supporter material 31 of a pair is formed in each of a nonwoven fabric 11a top and the bottom.

[0046] Horizontal array pair 34 and nonwoven fabric 11a is put by heating cylinders 35a and 35b among the mold release sheets 36a and 36b (i.e., between heating cylinders 35a and 35b) with nonwoven fabric 11b supplied from the bottom, and nonwoven fabric 11c supplied from the bottom. Thereby, the horizontal array object 34 is joined to each of nonwoven fabrics 11a, 11b, and 11c by those heating cylinders, and the horizontal elasticity compound sheet 37 with which it comes to carry out the laminating of them is produced. With this elasticity compound sheet 37, it has a laminated structure by which nonwoven fabric 11b was joined to the top face of nonwoven fabric 11a through the horizontal array object 34, and nonwoven fabric 11c was joined to the inferior surface of tongue of nonwoven fabric 11a through the horizontal array object 34.

[0047] Then, rubber strand 16a is cut by the rotation knife 47 near the yarn supporter material 31 by the longitudinal direction both ends of the horizontal array object 34 being put between a roll 50 and the rotation knife 47. Thereby, the horizontal elasticity compound sheet 37 is separated from each of the yarn supporter material 31 of a pair, and the detached horizontal elasticity compound sheet 37 is rolled round by the winding roll 38 via roll 43f. Rubber [dissociating from the horizontal elasticity compound sheet 37, and having adhered to the yarn supporter material 31] strand 16a is removed from the yarn supporter material 31 by the removal member 51.

[0048] Although the yarn guide apparatus which consists of a ring 32 or a bobbin 33 showed one example by the manufacturing installation of drawing 3, as shown in drawing 1 (c), rubber strands can produce the oblique intersection rubber array object which crossed diagonally mutually by forming the two yarn guide apparatus and making hard flow rotate those yarn guide apparatus of each other. And the horizontal elasticity compound sheet of a configuration of having been shown in drawing 1 (c) is manufactured by carrying out the laminating of the skew rubber array object to a nonwoven fabric. In this manufacturing installation, by adjusting the travel speed of the yarn supporter material 31, and the rotational speed of a ring 32, rubber strand 16a which it lets out from a bobbin 33 can be mostly made parallel with a longitudinal direction, or can carry out a skew to a longitudinal direction.

[0049] At the manufacturing installation shown in drawing 3 , nonwoven fabric 11a is supplied to a production line by the upstream of the part where rubber strand 16a is twisted around the yarn supporter material 31. In such a case, if the nonwoven fabric of two sheets is piled up and supplied to the supply path of nonwoven fabric 11a, the horizontal elasticity compound sheet of two sheets will be manufactured by one production process. Moreover, when supplying nonwoven fabric 11a by the upstream of a ring 32 in a production line and not supplying nonwoven fabrics 11b and 11c to a production line, the horizontal elasticity compound sheet with which rubber strand 16a was joined to the both sides of nonwoven fabric 11a is manufactured.

[0050] Furthermore, only nonwoven fabric 11c may be supplied, without supplying only nonwoven fabric 11b to a production line, without supplying nonwoven fabrics 11a and 11c among nonwoven fabrics 11a-11c, or supplying nonwoven fabrics 11a and 11b. In this case, after rubber strand 16a is twisted around the yarn supporter material 31, the horizontal elasticity compound sheet with which rubber strand 16a was joined to one side of nonwoven fabrics 11b or 11c is manufactured. Moreover, if nonwoven fabrics 11b and 11c are supplied without supplying nonwoven fabric 11a, the horizontal elasticity compound sheet with which rubber strand 16a was inserted among the nonwoven fabrics 11b and 11c of two sheets will be manufactured.

[0051] Although drawing 3 showed the example through which each of the yarn supporter material 31 of a pair circulates, yarn supporter material does not necessarily need to circulate. For example, you may make it run the yarn together with a product using the yarn which has reinforcement as yarn supporter material. In that case, the yarn for support is removed in the phase where the last product was produced. Manufacture of such a method may suit more, when the nonwoven fabrics 11a, 11b, and 11c without dimensional stability are used for a lengthwise direction.

[0052] Moreover, although drawing 3 showed the example using the cable through which it circulates as yarn supporter material 31, it is not necessary to necessarily use a circulation cable, and the circulation belt of the shape of a sheet of one sheet may be used as yarn supporter material. In addition, although drawing 3 also showed the example of equipment in case the quality of the material of rubber strand 16a is thermoplastic elastomer, when the quality of the material of rubber strand 16a is natural rubber which does not show thermoplasticity, and rubber strand 16a lets out from a bobbin 33, the supply means of the adhesives to rubber strand 16a is needed, such as carrying out the spray of the adhesives to rubber strand 16a, and applying them to it.

[0053] Drawing 4 is the side elevation showing the example of further others of the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied. Drawing 5 is the plan of the manufacturing installation shown in drawing 4 , and drawing 6 is the side elevation having expanded and shown the yarn supporter material shown in drawing 4 and drawing 5 .

[0054] In the manufacturing installation shown in drawing 4 and drawing 5 , the yarn supporter material 71 of the shape of long and slender tubing of a pair keeps spacing in a longitudinal direction, and is arranged in parallel mutually. Each yarn supporter material 71 is attached pivotable on the frame 82 by the bearing 91 of the pair attached in the both ends. Each yarn supporter material 71 is supported by these frames 82 and the bearing 91. These yarn supporter material 71 rotates in the same direction mutually according to the device mentioned later.

[0055] The yarn guide apparatus 72 for twisting rubber strand 16b around each edge of the yarn

supporter material 71 of a pair is supported pivotable centering on the revolving shaft parallel to the yarn supporter material 71 by the support device in which it does not illustrate. This yarn guide apparatus 72 is rotated around the yarn supporter material 71 of a pair by the device mentioned later. Rubber strand 16b has 200% or more of elasticity in the die-length direction. The yarn guide apparatus 72 consists of hollow shaft 72a, perpendicular partial 72b, parallel part 73c, and a piping member continuously prolonged in order of 73d of points. Hollow shaft 72a is arranged in the center of rotation of the yarn guide apparatus 72, and sprocket 84d is prepared in the peripheral face of hollow shaft 72a. Perpendicular partial 72b was prolonged in the almost perpendicular direction to hollow shaft 72a, and parallel part 72c is prolonged in the direction parallel to hollow shaft 72a. 73d of points is prolonged toward the center of rotation of the yarn guide apparatus 72 from parallel part 72c, and the perimeter of the yarn supporter material 71 of a pair is rotated.

[0056] In hollow shaft 72a of the yarn guide apparatus 72, the rubber strand 16b lets out from the bobbin 75 around which rubber strand 16b was wound. After rubber strand 16b supplied to hollow shaft 72a is guided in the inside of the yarn guide apparatus 72, it lets it out from 73d of points, and it is twisted around the yarn supporter material 71 of a pair by rotation of the yarn guide apparatus 72. Between hollow shaft 72a and a bobbin 72, the guide plate 87 with which hole 87a was formed is arranged, and rubber strand 16b from a bobbin 72 is sent in in hollow shaft 72a through hole 87a. It fishes in the connection of hollow shaft 72a and perpendicular partial 72b as the part except hollow shaft 72a of the yarn guide apparatus 72, and the spindle 92 is attached in it with the attachment rod 93 parallel to parallel part 72b for doubling.

[0057] As shown in drawing 6, screw slot 74a as the engagement section to which rubber strand 16b twisted around the member engages with each peripheral face of the yarn supporter material 71 of a pair is formed over the other end from the die-length direction end section of the yarn supporter material 71. screw slot 74a is for rotation actuation of the yarn supporter material 71 being alike, and moving it to the die-length direction of the yarn supporter material 71, i.e., a lengthwise direction, with rubber strand 16b inserted in the slot. Moreover, each yarn supporter material 71 is equipped with gearing 86a for rotating it, and screw slot 74b which lapped with a part of screw slot 74a is formed in the peripheral face of each gearing 86a. As shown in drawing 5, the horizontal array object 73 with which rubber strand 16b is arranged in a longitudinal direction, and becomes is formed with rotation actuation of each yarn supporter material 71 among them, and the horizontal array object 73 is made to convey in such yarn supporter material 71 of the pair of a configuration by the lengthwise direction. In case rubber strand 16b which has the yarn supporter material 71 top conveyed at this time passes the inside of a bearing 91, and gearing 86a, it is transported to a lengthwise direction by the configuration of the screw slots 74a and 74b, without contacting members other than yarn supporter material 71.

[0058] Between the yarn supporter material 71 of a pair, the nip rolls 76a and 76b of a pair which put the horizontal array object 73 and rotate are arranged. Moreover, on nip rolls 76a and 76b, roll 81a for supplying 11d of nonwoven fabrics from the bottom among those rolls is arranged, and roll 81b for supplying nonwoven fabric 11e from the bottom among those rolls is arranged at the nip rolla [76] and 76b bottom. With such a configuration, the horizontal array object 73 can be made to be able to put among nonwoven fabrics 11d and 11e with nip rolls 76a and 76b, the laminating of them can be carried out, and, thereby, the horizontal elasticity compound sheet 77 which consists of a horizontal array object 73 and nonwoven fabrics 11d and 11e is produced. It comes to arrange a fiber in a lengthwise direction, and each of nonwoven fabrics 11d and 11e has

100% or more of ductility in the longitudinal direction (cross direction).

[0059] Heating-cylinder 78a and nip roll 79a which put 77 are arranged at the migration direction downstream of the horizontal elasticity compound sheet 77 sent out from the yarn supporter material 71 of a pair in roll 81c and the horizontal elasticity compound sheet sent out from the roll. Furthermore, heating-cylinder 78b and nip roll 79b which put the horizontal elasticity compound sheet 77, and winding roll 81e which rolls round the horizontal elasticity compound sheet 77 sent out from between them via roll 81d are arranged at the downstream. The motor (un-illustrating) as a rotation driving gear made to rotate it is connected to winding roll 81e. In case the horizontal elasticity compound sheet 77 is twisted around the peripheral face of heating-cylinder 78a so that nonwoven fabric 11e may contact the cylinder, in case the horizontal elasticity compound sheet 77 passes through a heating-cylinder 78a top, and it passes through a heating-cylinder 78b top, the horizontal elasticity compound sheet 77 is twisted around the peripheral face of heating-cylinder 78b so that 11d of nonwoven fabrics may contact the cylinder.

[0060] Moreover, this manufacturing installation is equipped with the motor 83 as a driving means for rotating the yarn guide apparatus 72 and each yarn supporter material 71. While revolving-shaft 85a for rotating one [the yarn guide apparatus 72 and] yarn supporter material 71 is connected to the revolving shaft of a motor 83, sprocket 84a for rotating the yarn supporter material 71 of another side through revolving-shaft 85b etc. is attached. Gearing 86b which gears with sprocket 84c for telling the power of a motor 83 to the yarn guide apparatus 72 and gearing 86a of one yarn supporter material 71 is attached in revolving-shaft 85a. Chain 89a for telling power is attached in Sprockets 84c and 84d. On the other hand, sprocket 84b is attached in the end of revolving-shaft 85b, and gearing 86b which gears with gearing 86a of the yarn supporter material 71 of another side is attached in the other end. Chain 89b for telling power is attached in Sprockets 84a and 84b.

[0061] Furthermore, this manufacturing installation may be equipped with bobbin 75a around which the yarn 90 supplied in the yarn supporter material 71 was twisted if needed. The yarn 90 which it lets out from bobbin 75a is supplied in the yarn supporter material 71 from the opening edge of the migration direction upstream of the horizontal array object 73 in the yarn supporter material 71, and passes through the inside of the member. Therefore, yarn 90 is conveyed through the inside of the yarn supporter material 71 so that it may be located inside the loop formation of rubber strand 16b at the longitudinal direction both ends of the horizontal array object 73. Thus, by letting yarn 90 pass to the both ends of the horizontal array object 73, rubber strand 16b is supported by yarn 90 on a production line. Consequently, in the horizontal array object 73, the array of rubber strand 16b is held by yarn 90, and the reinforcement of the horizontal elasticity compound sheet 77 improves. When the horizontal elasticity compound sheet 77 passes heating-cylinder 78a and 78b and the sheet becomes that a heating cylinder is likely to be pasted, yarn 90 serves to pull apart the horizontal elasticity compound sheet 77 from a heating cylinder.

[0062] Next, actuation of this manufacturing installation is explained.

[0063] First, rubber strand 16b lets out from a bobbin 75 with rotation actuation of the yarn guide apparatus 72, and the rubber strand 16b is supplied to the yarn supporter material 71 through the yarn guide apparatus 72. Supplied rubber strand 16b is twisted around the yarn supporter material 71 of a pair, and is inserted in in each screw slot 74a. As for inserted-in rubber strand 16b, the inside of screw slot 74a is sent to the longitudinal direction of the member by rotation

actuation of each yarn supporter material 71. And the horizontal array object 73 of a rubber strand is formed between the yarn supporter material 71 of a pair of rubber strand 16b continuously supplied by rotation of the yarn guide apparatus 72.

[0064] Next, by nip rolls 76a and 76b, 11d of nonwoven fabrics is supplied to the top face of the horizontal array object 73, nonwoven fabric 11e is supplied to the inferior surface of tongue of the horizontal array object 73, and those nonwoven fabrics are put between the horizontal array object 73 and coincidence which were spent by rotation of the yarn supporter material 71 between nip roll 76a and 76b.

[0065] When the quality of the material of rubber strand 16b is thermoplastic elastomer, rubber strand 16b becomes the horizontal elasticity compound sheet 77 joined to nonwoven fabrics 11d and 11e by heating nip rolls 76a and 76b. Then, junction to rubber strand 16b and nonwoven fabrics 11d and 11e is strengthened by inserting the horizontal elasticity compound sheet 77 into heating-cylinder 78a and nip roll 76a, and inserting it into heating-cylinder 78b and nip roll 76b further. And the horizontal elasticity compound sheet 77 is considered as the roll 80 rolled round by winding roll 81e.

[0066] Like [when the basis weight of nonwoven fabrics 11d and 11e is small], with a production line, when conveyance of the horizontal elasticity compound sheet 77 is difficult, the yarn 90 of high intensity is inserted in the handle part of the both sides of the horizontal array object 73 etc. as mentioned above by inelasticity, and even if easy [in conveyance of the horizontal elasticity compound sheet 77] by the yarn 90, it is good. In this case, the part in which yarn 90 was inserted is removed and the horizontal elasticity compound sheet 77 can be used.

[0067] In the manufacturing installation shown in drawing 4 - drawing 6 , the nonwoven fabric was supplied to the both sides of the horizontal array object 73, and the horizontal elasticity compound sheet by which rubber strand 16b was sandwiched from the upper and lower sides with nonwoven fabrics 11d and 11e was manufactured. On the other hand, a horizontal elasticity compound sheet can also be manufactured by supplying only either of the nonwoven fabrics 11d and 11e, and joining to the horizontal array object 73.

[0068] Although drawing 4 and drawing 5 showed the case where the yarn guide apparatus 72 was a piece, the productivity of a horizontal elasticity compound sheet can be raised supplying two or more rubber strand by preparing many yarn feed hoppers, and by forming a yarn guide apparatus in multistage. Moreover, in order to produce the horizontal elasticity compound sheet with which rubber strands crossed diagonally the same with having explained in the manufacturing installation of drawing 2 or drawing 3 , a yarn guide apparatus may be formed in multistage. In this manufacturing installation, according to the configuration of the screw slots 74a and 74b formed in the yarn supporter material 71 of a pair, and the physical relationship of the screw slots on the pair, rubber strand 16b which it lets out from the yarn guide apparatus 72 can be mostly made parallel with a longitudinal direction, or can carry out a skew to a longitudinal direction.

[0069] Moreover, although drawing 4 - drawing 6 showed the example which makes rubber strand 16b unite with nonwoven fabrics 11d and 11e with the nip rolls 76a and 76b arranged between the yarn supporter material 71 of a pair. The group of rubber strand 16b arranged in the longitudinal direction between the yarn supporter material 71 of a pair can be moved on heating-cylinder 78a with much yarn through which it circulates, and it can also be made to unite with the nonwoven fabric supplied on the cylinder.

[0070] Next, the ingredient used by each manufacturing installation mentioned above, the

description of the manufacturing installation, etc. are explained in detail.

[0071] In the manufacture approach of this invention, what fabricated natural rubber, synthetic rubber, and thermoplastic elastomer in the shape of a strand is used as a class of rubber used as the ingredient, i.e., the elasticity elastomer, of a rubber strand. As this rubber strand, the thing of various configurations, such as a thing of the shape of a rectangular tape, may be used not only for the thing of a round head but for a cross-section configuration, and the strand may consist of a monofilament, and a cross-section configuration may be the multifilament which is the aggregate of a filament. Moreover, spinning of the rubber strand is carried out just before the process which twists a rubber strand around yarn supporter material not only in the strand manufactured at the process other than the process explained with reference to drawing but in this invention, a rubber strand can be twisted around supporter material, or succeedingly, it is carrying out a laminating on a nonwoven fabric, and shortening of a process can also be attained.

[0072] Moreover, in each manufacture approach mentioned above, using what was fabricated in the shape of a strand as an elastic body has the advantage that the strand fabricated so that vulcanization etc. might be given and it might be the easiest to demonstrate rubber elasticity can be used. Moreover, it is because it is suitable for using the rubber elasticity object of the minimal dose most effectively by arranging a strand efficiently in the flexible direction of a compound sheet. Moreover, generally a rubber elasticity object has a bad moldability, and especially the rubber elasticity object for which such flexible fitness, such as a spring material of the diaper which is having 200% or more of big telescopic motion repeated, is needed has a bad moldability. Then, it is most suitable to adopt shaping of the strand which is the simplest fabricating method.

[0073] By the manufacture approach mentioned above, the quality of the materials of a rubber strand are thermoplastic elastomer, synthetic rubber, natural rubber, etc. as mentioned above, and the strand which has 200% or more of rubber elasticity-elasticity is used. However, it does not require to the residual distortion at the time of recovering, after the rubber strand developed 200% being zero; and it can be used even if it has dozens of% of residual distortion.

[0074] In the manufacture approach of this invention, especially thermoplastic elastomer suits as the quality of the material of a rubber strand. Possible [junction of a rubber strand and a nonwoven fabric] for thermoplastic elastomer only with heat, from becoming simple [a process], cost can be markedly made cheap and a horizontal elasticity compound sheet can be manufactured.

[0075] As thermoplastic elastomer of a rubber strand, elastomers, such as a polyolefine system, synthetic rubber, a polyester system, a polyamide system, and a polyurethane system, are used. It expands and contracts for a high scale factor, and moreover, since the stress at the time of telescopic motion is small, it is [among these] most suitable [the synthetic-rubber system or polyurethane system to which copolymerization of styrene and the olefin was carried out] as an elastomer of a rubber strand. In addition, strands by heat etc., such as natural rubber with the difficult junction to a nonwoven fabric and vulcanization synthetic rubber, are pasted up on a nonwoven fabric by latexes, such as synthetic rubber and natural rubber, etc. among rubber strands.

[0076] The fiber which constitutes the nonwoven fabric used as the ingredient of a horizontal elasticity compound sheet means the fiber of the wide sense which means both a staple fiber (short fiber) and a continuous filament. The fiber may be a fiber of semi-synthetic fibers, such as the thing and rayon which consist of a fiber of natural fibers, such as a thing which consists of

polymers for synthetic fibers, such as usual polypropylene, a polyamide, and polyester, and cotton, silk, and acetate.

[0077] The nonwoven fabric used in case a horizontal elasticity compound sheet is manufactured needs to have at least 100% or more of ductility in the fixed direction. Thus, as an example of the nonwoven fabric which has 100% or more of ductility, there is a nonwoven fabric which the fiber arranged to the one direction, and the ductility of the nonwoven fabric of the array direction and direction of a right angle becomes 100% or more as indicated by JP,8-174764,A and JP,11-222759,A.

[0078] By the manufacture approach of this invention, it is the direction and the direction of a right angle which the fiber arranged, ductility is several % to dozens of % in the array direction of a fiber, the elongation stress of 100% or more of ductility of a nonwoven fabric is also large, and an elasticity compound sheet with dimensional stability is obtained in this direction.

[0079] As a nonwoven fabric for elasticity compound sheets, nonwoven fabrics which consist of a continuous glass fiber filament, such as a nonwoven fabric which extended the span bond nonwoven fabric or the melt blow nonwoven fabric, and a nonwoven fabric explained in full detail to the vertical extension nonwoven fabrics (JP,3-36948,B, JP,10-204767,A, etc.) of point invention by this invention persons or a nonwoven fabric which opened the tow and was arranged to the one direction, are used. Also to hundreds of telescopic motion of a repeat, these continuous glass fiber filaments do not have the omission omission of fiber, and suit the so-called lint free application. Moreover, the extended nonwoven fabric has reinforcement and dimensional stability in the extension direction, and the extended nonwoven fabric can also use the property by this extension with garments etc. from becoming a glossy nonwoven fabric further.

[0080] In this invention, although the nonwoven fabric for horizontal elasticity compound sheets was indicated to be the nonwoven fabric extended by the lengthwise direction, even if it is a nonwoven fabric extended to the 2-way, the nonwoven fabric with which balance in every direction has collapsed is also contained in the nonwoven fabric extended by the lengthwise direction (one direction) of this invention by making draw magnification of a lengthwise direction high.

[0081] Moreover, the nonwoven fabric with which it comes to arrange a staple fiber also suits an one direction as a nonwoven fabric for horizontal elasticity compound sheets. The nonwoven fabric which consists of a staple fiber is cotton-aesthetic property, and a feel is good and is liked for the application referring to the skin. There is a web of a card riser etc. as a nonwoven fabric which the fiber which consists of a staple fiber arranged.

[0082] Moreover, as another example of the nonwoven fabric which has 100% or more of ductility, by performing flexible processing, rib attachment processing including contraction processing or folding processing, and pleating, etc., you may process it into a span bond nonwoven fabric or the usual staple fiber nonwoven fabric so that it may have ductility in a longitudinal direction.

[0083] With flexible processing, not only flexible processing of the narrow sense which gives a softening agent to a nonwoven fabric but shrink-proofing, such as Sanforizing, and processing used as a soft nonwoven fabric with big ductility by physical means by which a rib is not observed by appearance, such as embossing, are included.

[0084] Contraction processing is processing which shrinks cloth physically or chemically, and it is common also in flexible processing mentioned above in part, including what is called milling

processing with which a fiber is made to become entangled. There is an approach indicated by JP,6-57620,A etc. as an approach of making a lengthwise direction or a longitudinal direction contracting cloth physically.

[0085] Rib attachment processing prepares much regular or irregular small Siwa and **** in cloth including fold-up processing, pleating, etc., and processing which gives extensibility to cloth is said. A rib is put into a longitudinal direction, it considers as the example which enlarges ductility in a lengthwise direction, and SANHO rise processing (refer to U.S. Pat. No. 2324245 specification), mechanical shrink-proofing, such as a double width SUTAFIN box (refer to JP,5-41742,B), processing using the manufacture approach of the crepe paper in the paper manufacture industry, processing that puts a rib into a lengthwise direction combining two rollers which have many slots in shaft orientations are mentioned. Moreover, it can also consider as the nonwoven fabric which has elasticity in a lengthwise direction or a longitudinal direction by devising an embossing pattern. It is processing [which], and it is contained in rib attachment processing as used in this specification when a peach and a rib arise.

[0086] As for the nonwoven fabric for horizontal elasticity compound sheets, 200% or more of ductility is desirably required of an one direction at least 100% or more. When the ductility of the one direction of a nonwoven fabric was 100% or more, it has checked from the experimental result that 200% or more of elasticity to repeat is shown as a compound sheet with an elastomer.

[0087] The approach of this invention of manufacturing a horizontal elasticity compound sheet using these rubber strands and nonwoven fabrics has the process which manufactures the horizontal array object with which a rubber strand arranges and becomes a longitudinal direction mostly as mentioned above.

[0088] Although it is contained also when the rubber strand has arranged the horizontal array object of a rubber strand in the longitudinal direction (cross direction), i.e., the longitudinal direction of a nonwoven fabric, and the rubber strand is carrying out the skew a little from the longitudinal direction, a thing when an include angle with the smaller include angle which a longitudinal direction and a rubber strand make is smaller than 45 degrees is said.

[0089] A rubber strand has the advantage which takes the above horizontal arrangement in the point which can arrange a strand effective in the direction of the purpose with a simple means. Moreover, lateral elasticity can be given in the minimum amount of strands. Moreover, when the rubber strand is carrying out the skew a little, or when it crosses, there is also a merit from which the elongation tension of a horizontal elasticity compound sheet can be adjusted, and early **** tension is small and becomes a mellow load elongation curve in the compound sheet with extent of the slant.

[0090] A rubber elasticity property, ductility, endurance, etc. have the advantage which uses a rubber strand in this invention in the point which can use efficiently the established rubber strand manufactured appropriate. That is, it is because the width of face of selection of an ingredient side is wide that the strand with which it does not have the gestalt-fault to which the intersection part of elastic bodies becomes thick as compared with the case where the network of a rubber elasticity object, a nonwoven fabric, a film, etc. are used, and shaping was fabricated from difficult natural rubber latex can be used etc. Moreover, the target load elongation curve, a hysteresis curve, etc. are realizable in the minimum amount of rubber from those things. It is important also from the field of such a product property that there are few amounts of rubber to be used not only with the field of economical efficiency but the product of these days expected the thin and light product.

[0091] By the manufacture approach of this invention, the means which twists the rubber strand on supporter material is used. The typical thing of the means which twists around supporter material the usual yarn which does not have rubber elasticity has the technique (France addition JP,79765,B) developed by SHABANO of France, and various the amelioration invention is also made (France JP,1208968,B, JP,47-14791,B, JP,51-2543,B, JP,51-78879,A, etc.). These are the examples of a means to manufacture the horizontal array object of yarn, by leading usual yarn to the rotating yarn guide apparatus, and twisting yarn around the long and slender pivotable yarn supporter material of the pair which set spacing and has been arranged.

[0092] Moreover, a rubber strand makes it run the sheet-like belt which is yarn supporter material, or the form-of-a-rope belt of a pair as other examples which twist another different yarn around supporter material, and has the method which twists yarn around the supporter material. As a typical example in the case of the usual yarn which does not have rubber elasticity, there are some which were indicated by United States Patent specification No. 3041230 and JP,47-49796,B.

[0093] Moreover, the typical example which twists around cylinder-like supporter material the usual yarn which does not have rubber elasticity as an example which twists another different yarn from a rubber strand around supporter material is indicated by United States Patent specification No. 2797728 and JP,40-35506,Y.

[0094] By using the manufacture approach of the network established with the usual yarn which is not rubber, this invention uses effectively the elastic body used in case a horizontal elasticity compound sheet is manufactured, and makes it possible to manufacture a horizontal elasticity compound sheet at a high speed in a simple manufacture process. That is, this invention is adapted for the rubber strand which has 200% or more of elasticity in the horizontal array means of the above-mentioned usual yarn, and the description is in the point of having enabled it to manufacture a horizontal elasticity compound sheet, by joining the rubber strand to the nonwoven fabric which has 100% or more of ductility in a longitudinal direction further.

[Translation done.]

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EXAMPLE

[Example] (Example 1) The horizontal elasticity compound sheet was produced using the manufacturing installation shown in drawing 2. The basis weight of 20g/the vertical array nonwoven fabric of m2 which extended the basis weight (mass per unit area) of 50g/the span bond nonwoven fabric made from polypropylene of m2 2.5 times to the lengthwise direction, and was obtained as a nonwoven fabric 11 was used. The nonwoven fabric 11 with a width of face of 1200mm is twisted around the cylindrical supporter material 13 with a diameter of 320mm by which mold release processing was carried out of Teflon (trademark). And it is made to run a nonwoven fabric 11 on the cylindrical supporter material 13, and after spraying natural rubber latex on the vulcanized natural rubber strand (total fineness of 250tex), the rubber strand is twisted at intervals of 2.5mm pitch on the nonwoven fabric 11 it runs.

[0096] Thus, the horizontal elasticity compound sheet was manufactured for the rubber strand a laminating and by joining on the nonwoven fabric 11. The basis weight of the obtained horizontal elasticity compound sheet was 172 g/m², and residual distortion was 7% when 200% of telescopic motion was repeated 20 times in the longitudinal direction of a sheet.

[0097] (Example 2) The horizontal elasticity compound sheet was produced using the manufacturing installation shown in drawing 3. The pair twisted the strand (total fineness of 180tex) of SEBS (styrene-ethylene butylene-styrene) system resin (Clayton G1857 made from shell JAPAN) yarn supporter material 31 at intervals of 5mm pitch, and the horizontal array object 34 was formed.

[0098] Then, the card web of the cotton which has 100% or more of ductility in a longitudinal direction by contraction processing was joined to the horizontal array object 34, and the horizontal elasticity compound sheet of basis-weight 145 g/m² was manufactured. Even if it repeated 200% of telescopic motion 10 times in the longitudinal direction of a sheet, the horizontal elasticity compound sheet with which residual distortion has 15% of elasticity was obtained.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the top view showing the horizontal elasticity compound sheet produced by the manufacture approach of this invention.

[Drawing 2] It is the perspective view showing the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[Drawing 3] It is the perspective view showing other examples of the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[Drawing 4] It is the perspective view showing the example of further others of the equipment with which the manufacture approach of the horizontal elasticity compound sheet of this invention was applied.

[Drawing 5] It is the plan of the manufacturing installation shown in drawing 4 .

[Drawing 6] It is the side elevation having expanded and shown the yarn supporter material shown in drawing 4 and drawing 5 .

[Description of Notations]

1, 11, 11a, 11b, 11c, 11d, 11e Nonwoven fabric

2a, 2b, 2c, 16, 16a, 16b Rubber strand

12 Guide

13 Cylindrical Supporter Material

14 Turntable

14a Fixed angular table

14b Supporter material

14c Support device

15 Bobbin

17, 34, 73 Horizontal array object

18 Heating Roller

19 Joint

20, 37, 77 Horizontal elasticity compound sheet

21 Knife

22 Guidance Implement

23a, 23b Nip roll

24, 46a, 46b, 83 Motor

25a, 25b, 45a, 45b, 45c Gear

26 Shaft

27 Pulley
28 Belt
31 71 Yarn supporter material
32 Ring
32a Internal tooth
33 Bobbin
33a Shaft
35a, 35b, 78a, 78b Heating cylinder
36a, 36b Mold release sheet
38 Winding Roll
41a-41c Shaft
42a-42c Belt pulley
43a-43f, 44a, 44b, 50, 80, 81a, 81b, 81c, 81d Roll
47 Rotation Knife
48 Table
48a Slot
48b Accommodation bolt
48c Shaft
49 Roller
51 Removal Section
52 Spray Nozzle
53 Interior Material of Proposal
72 Yarn Guide Apparatus
72a Hollow shaft
72b Perpendicular part
72c Parallel part
72d Point
74a, 74b Screw slot
75 75a Bobbin
76a, 76b, 79a, 79b Nip roll
81 Winding Roll
82 Frame
84a, 84b, 84c, 84d Sprocket
85a, 85b Revolving shaft
86a, 86b Gearing
87 Guide Plate
87a Hole
89a, 89b Chain
90 Yarn
91 Bearing
92 Spindle
93 Attachment Rod

[Translation done.]